

# COMPUTERWORLD

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## New Tape Inscrivers Offered

New off-line keyboard terminals that allow data to be put on magnetic tape for computer input have been announced by IBM and Sangamo Electric Co.

The IBM 50 units use an IBM 2495 tape cartridge reader (functionally equivalent to a card reader) to transfer data from the tapes to a System/360 computer. The Sangamo Data Station prepares tapes that may be mounted directly on a computer tape drive.

### IBM Units

The new IBM units are designed to help System/360 users get information into their computers more effectively when punched cards are not required as a record.

A single tape cartridge reader can serve multiple data inscribers.

Using the IBM 50's keyboard, the operator enters data from invoices, order forms, and other source documents. The information is recorded on magnetic tape housed in a small plastic cartridge.

The cartridge then is placed in the tape cartridge reader, which automatically feeds the information into computer storage at a speed of 900 cps.

Records of varying lengths may be entered by the magnetic data inscriber's operator. The unit allows the operator to pre-set the arrangement of data to be keyed in, and to indicate where repetitive data should be entered automatically. The operator may establish, and subsequently select, up to eight different formats directly from the keyboard.

### Automatic Verification

An additional feature allows automatic verification of recorded data.

Other important characteristics of the IBM 50 include:

A special provision that allows the operator to correct keying errors.

(Continued on Page 2)



Sangamo's new Data Station prepares computer-ready tape.



Volunteers handle calls for assistance at the Citizens Information Service Center after the Washington civil disorders. Needs were cross referenced against resources by a mechanical data processing system.

## DP System Helped Riot Relief Efforts

WASHINGTON — A mechanical data processing system that never touches its master file was used to help rush aid to the victims of the April 5-7 civil disorders here. It was possibly the first time an automated system was used to coordinate such an assistance program.

The Termatrix system lent by the manufacturer, the Jonker Corp. of Gaithersburg, Md., was set up in 20 minutes, "programmed" within a few hours, and then allowed answers to be given to telephone inquiries while the caller held on.

A digital computer could not have been used in the crisis because of the time that would have been needed to program it, said Fred Jonker, president of the Jonker Corp.

Requests for assistance from persons who had lost their homes or needed emergency transportation poured into the Citizens Information Service Center where volunteers manned a dozen telephones. While callers were still on the line, pleas for assistance were cross referenced against available sources of food, clothing, homes, and manpower. Some 1000 requests were answered within the first four days.

### How It Worked

The \$6000 Termatrix system, manned by people from Jonker and from Systemetrics Corp., uses a search method of optical coincidence. The master file is referenced indirectly through the use of punched category cards.

For example, John Doe called the center and offered to provide transportation from Northwest to Northeast Washington between 5 and 6 p.m. John Doe was immediately assigned the next sequential number in the master file. A hole representing the master file number was then drilled by a machine in each of the appropriate category cards, such as "transportation," "Northwest Washington," "Northeast Washington," and "5 to 6 p.m."

Sometime later nurse Mary Roe requested a ride from Northwest Washington to Northeast Washington between 5 and 6 p.m. The category cards giving the parameters of her needs were pulled from a file and stacked on a reader. Since all of the requirements could be filled by John Doe, a light shone through the stack of cards at the hole representing his code number.

John Doe's master file card was then located by the code number, pulled from the file and the information given to Mary Roe.

Each category card could have up to 10,000 holes punched in it, which meant that the master file could have that many entries.

### System Praised

"The system was pretty effective," said Robert Rogers, a management analyst for the Washington, D.C. government. "It

(Continued on Page 3)

## Students Steal Show As Conference Opens

ATLANTIC CITY — The Spring Joint Computer Conference opened here Tuesday — and a group of high school students promptly stole the show with an informal on-line computer demonstration on the Convention Hall balcony.

Because of the telephone strike, most of the time sharing demonstrations here were by the 15,000 persons at the conference trying to use the few pay telephones in the hall. The Communications Workers strike had made it impossible to install extra telephones for the conference.

But at least one firm, Applied Logic, did manage to get on-line with a computer at its main office in Princeton, N.J. There was no immediate explanation of how they established data communications.

AT&T Board Chairman H.I. Romnes, the keynote speaker, departed from his prepared speech for a moment to congratulate the exhibitors on their handling of the strike problems and to thank the public for its patience.

### Conference Action

Among the early conference highlights were an announcement by Vermont Research Corp. that it would market disk drives and the start of a potential fight over magnetic tape certification.



H. I. Romnes

## EDP Stocks Up 7.4%; Some Set New Highs

Gains made by computer stocks far outpaced those made by stocks in general last week. CW's Computer Stock Composite Index rose 7.38% compared with a rise of only .89% in the Dow Jones industrial average, which stood at 906 on Friday's close. Only nine computer stocks lost ground during the week, and three remained even. Several set highs for the year.

One of these was Control Data, which rose to a 1968 high of 155-1/4, but ended the week at 149-3/4, up 5%. Several other stocks in the Computer Systems Sector fared even better. Honeywell gained 6% to close at 129-3/4 after setting a new high of

(Continued on Page 13)

Vermont Research is the first small, independent manufacturer to offer drives primarily to original equipment manufacturers. All the drives are compatible to the IBM 2311, which now seems established as the standard.

Memorex announced and displayed its new 660 disk drives, which have four times the storage capacity of the IBM 2311. The 660 is compatible to the IBM 2314, but unlike it, can be bought drive by drive instead of having to buy nine drives together. The 660, like the Memorex 630, has an average access time of 50 msec. The IBM 2314 access time is 75 msec. First deliveries are scheduled for next January.

The announcement by 3M that it was offering its high grade tapes without certification at approximately 25% off has started a debate over whether certification is necessary.

### Balcony Performance

The Resistors (radically emphatic students interested in science technology or research studies), made up of science-minded students aged 10 to 17, used a pay telephone to go on-line with a PDP-8 at Western Electric's Engineering Research Center in Hopewell Township, N.J.

Their demonstration of display terminals connected to a telephone line with an acoustic coupler quickly drew a fascinated crowd of persons from all the big companies, including AT&T and IBM.

The equipment the Resistors are using is available from Korvette, and a sign at the display suggests you buy it on your mom's or dad's charge card.

(Continued on page 16)

## On the Inside

Applications .....	8
Calendar .....	14
Careers .....	15
Contracts .....	10
Editorials .....	4
EDPeople .....	10
Education .....	9
Financial .....	12, 13
New Products .....	16
Orders and Installations .....	14
Societies .....	6
Software .....	11
Viewpoint .....	5

## Warranty Limits Come Under Fire

WASHINGTON, D.C. — The April issue of *Consumer Reports*, a normally well informed magazine on consumer problems, reports that there is considerable sentiment in Washington to pass laws restricting types of warranty.

One such proposal includes the contracts which apply to any item costing more than \$100. While from the point of view of *Consumer Reports* this is particularly aimed at car manufacturers, it would also apply to many of the computer contracts which have restrictive warranties.

### Courts Reject Restrictions

The magazine points out that the courts have recently refused to be bound by the style of warranties and instead are coming to recognize claims made in advertising as an enforceable warranty in their own right.

The Florida Supreme Court recently ruled that, "despite the expressed warranty of the manufacturer, a customer may recover damages 'on the basis of an implied warranty of a product due to its defects and lack of thickness and suitability (for intended use).'" In this particular case the justices quoted as precedent the following opinion of a Tennessee court:

"The world of merchandising is, in brief, no longer a world of direct contract; it is, rather, a world of advertising and, when representations expressed and disseminated in the mass communication media and on labels . . . prove false and the user or consumer is damaged by reason of his reliance on those representations, it is difficult to justify the manufacturer's denial of liability . . . The protection [the consumer] really needs is against the manufacturer whose published representation caused him to make the purchase."

### Three Proposals

Some of the legal proposals being mentioned are:

- 1) To require manufacturers to replace defective products or refund the consumer's money.
- 2) Establishment of compulsory arbitration procedures for settling warranty disputes.
- 3) Creation of an advisory council on guarantees, warranties, and servicing to study the need for further action.

Currently, it appears that the Administration is not intending to press for warranty legislation at least until attempts have been made to improve quality control and coverage.

## Xerox Chairman Says

## Technology Must Be Used to Aid Poor

CAMBRIDGE, Mass. — The new technology must help solve social problems, the chairman of Xerox Corp. told 300 Harvard business scholars in a lecture sponsored by the new Diebold Institute. "The resources exist to solve the problems of poverty and urban blight, and perhaps even racial strife," Charles C. Wilson stated.

"If the problems are not solved," he warned, "I have the uneasy feeling that the role of private enterprise may be downgraded and replaced by something else — perhaps some right-wing movement — I don't know what might happen."

### Social Evolution Seen

Social evolution in the business system is still possible, Wilson said April 23 in the first of a series of lectures on "Technological Change and Management." Corporate social responsibility is today "essential," the corporate leader commented. The danger is that management may become so technical and so highly functional that managers will lose both the capacity to take risks and the quality of social conscience.

Those who direct the new technology must first be interested in "bettering the human condition." Profits are secondary. Management must now accept its social responsibility, the Xerox chairman said, because "the alternative is potentially unthinkable."

If business does not tackle the problems of poverty and racial strife in the cities, he said, "leadership will fall to other segments in our society — and some of those segments would adopt solutions that would endanger all that we hold."

### Entrepreneurs Needed

Taking "The Entrepreneur" as his theme, Wilson said, "Civilization depends on a creative minority." The entrepreneur is the leader of leaders — a very small portion of the populace. There is a desperate need for managers who can analyze the social effects of an innovation and who are willing to take risks, he said.

"Management is largely responsible for the quality of life," Wilson asserted, adding, the best young people today insist that their life and their work must have meaningful social values.

In response to, a question by a Negro student, Wilson said that some 50 companies in Rochester, N.Y., including Xerox, are employing "totally unqualified, hard core" poor people and training them for useful occupations. A similar group of businesses has been formed for the purpose of creating businesses in or near the inner city areas. Xerox Corp. is cooperating with nonwhite groups in the area of low-income and middle-income housing.

"It is an investment in the future of society that, if successful, I think will pay off. It is the kind of thing that ought to be done in 150 cities across the country." The involvement of businessmen in the community is part of the job of taking care of the business, he said.

### Technological Change

Today's crops of machines will change human society fundamentally, Wilson told the business students, adding, "Industry is the best hope for solutions to the great problems by which our society is beset." The application of advanced technology to social problems is "the most profound opportunity" for business, for government, and for society itself. Wilson contended that business must participate "to a much greater degree" than it has in the past.



While an operator loads a tape cartridge into the IBM 50 magnetic data inscriber, left, another worker stacks tape cartridges on the IBM 2495 reader. The 2495 reads the tapes, transfers the data to the System/360 computer at 900 cps, rewinds the tapes, and stacks the cartridges.

## 2 More Key-to-Tape Units Announced

(Continued from Page 1)

A console which displays characters and shows the operator the area of the record being keyed.

Recording of automatic data entries, such as repetitive data, at 100 cps.

An automatic "left-zero" insertion which allows the operator to enter only significant data numbers. Preceding zeros are automatically inserted.

Reusable tape cartridges that can store up to 23,000 alphabetic or numeric characters, 20 cpi. One cartridge's data capacity is equivalent to about 300 punched cards.

### Compatible Code

The magnetic data inscriber records information in System/360 compatible code in nine tracks across the width of 16 mm magnetic tape. The tape cartridges are identical to those used with the IBM magnetic tape Selectric typewriter.

A dozen tape cartridges can be loaded at the same time into the reader, where they are read, rewound, and stacked automatically.

A magnetic tape Selectric may be used as a data entry device in applications where field definition is not important. One such application would be the entry of text data into computer storage.

Rental for the data inscriber is \$180 a month; purchase price, \$9900. The reader, which is attached by cable to the multiplexor channel of System/360 Models 25, 30, 40, and 50, has a basic monthly rental of \$350 and a purchase price of \$19,250. Each tape cartridge costs from \$12 to \$20, depending upon quantity.

Customer deliveries are scheduled to begin in the first quarter of 1969.

### Sangamo Data Station

The Sangamo Electric Co., Springfield, Ill., has designated its new data stations as the DS7100 (7 track, 200 bpi or 556 bpi) and the DS9100 (9 track, 800 bpi).

The new units offer features not previously available in the industry. Third generation circuitry and an alphanumeric display panel improve operator speed and accuracy. The combined keyboard, alphanumeric display, core memory, and magnetic tape unit are in a console that occupies the same floor space as a key-punch. The magnetic tape unit is located in a drawer to minimize distraction and noise.

The Sangamo Data Station is the only terminal which provides a continuous "English" display of the data stored and its location in memory. Errors can be corrected within a fraction of the time required for punched cards. Operator training time is drastically reduced because there are no complicated codes to decipher and there is an instant display panel to follow.

All information can be verified simply by touching the rewind switch and rekeying from source data. A data error automatically locks the keyboard until the error is corrected.

Tape reels snap on and off easily and a simple tape path eliminates complicated tape threading. The tape is controlled carefully and positively from supply reel to take-up reel at all times.

There will be advance or preproduction units available during late summer. Production units are scheduled for the last quarter of 1968. The models 7100 and 9100 will be the first units off the line. Pooling and communication terminals will follow in early 1969.

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## Needs Matched To Resources By DP System

(Continued from Page 1)

expedited locating things needed."

Richard N. Leahy, a Jonker staff consultant, added:

"There exists a great need for implementing a continuous human resources inventory in advance of civil disaster throughout the country. Each municipality can and should identify its volunteer talent for potential utilization in pressing urban and disaster relief."

An IBM spokesman said he did not know of any existing computer program to handle such resources coordination and didn't know of any requests for one.



Jonker and Systemetrics volunteers, using the Termatrix system, match needs against resources after the Washington civil disorders. Requests from the Citizens Information Center telephone room were cross referenced using the reader on the desk, then the appropriate master file numbers were relayed back to the telephone room. The unit used for punching category cards is at right.

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## CSC's New Leasing Company Will Offer Packaged Systems

CENTURY CITY, Calif. — Computer Sciences Corp. has started a leasing firm with a new twist. Aimed at capitalizing on the particular selling points of the software house itself, Computer Sciences Leasing Co. will handle Univac 9000 and 1108 series systems as well as 360s and Spectra 70s, and will include the costs of software and start-up as well as the hardware costs.

The new company, headed by Adrian C. Bos, formerly a marketing executive at Sperry Rand's Univac Division, has already started operation and has proposals out to Lockheed and other 1108 users.

Bos interrupted a nationwide tour to tell COMPUTERWORLD about the new organization.

"We have big skills at CSC in the 1107 and 1108 area, and with the 360," he said. "We recently completed a specialized 360/50 operating system and we have provided a time sharing operating system on the 1108. Our Cogent II software will, we believe, be a great help to the people who have to produce programs quickly, and we intend to see that the software skills that we have at our disposal are really brought into effective use at the user's installation."

"The new leasing company will specialize in non-payout leases, insofar as the hardware is concerned, but software costs will be on a full payout basis."

Bos comes to his new post after four years with Univac's Data Processing Division, where his most recent assignment was vice president for commercial marketing. Previously Bos held executive marketing positions with IBM, RCA, and Philco Corp.

CSC Leasing's principal market, Bos said, will be commercial concerns with large scale data processing systems. But, he said, his organization would also seek to place computers with a variety of other types of organizations, such as hospitals and state and local government agencies.

Within one year, the firm expects to have more than \$20 million in computers and related peripheral equipment on lease, Bos said.

The organization will obtain its initial financing in the form of a contribution to capital from the parent CSC and from bank loans.

Computer Sciences Corporation provides industry, science, and government with computer system design and related services, systems engineering, and management services in advanced technologies, education systems, and industrial and consumer marketing research.



Adrian S. Bos

## EDP Maintenance Costs Government \$50 Million

WASHINGTON — Maintenance of federal EDP equipment is costing \$50 million a year and more emphasis should be placed on in-house maintenance to cut these costs, the General Accounting Office (GAO) says in a new report.

Agencies are urged to investigate their costs to find out whether in-house maintenance would be cheaper than contract maintenance.

The report, "Maintenance of Automated Data Processing Equipment in the Federal Government," cites examples in which in-house maintenance has saved money, as much as \$537,000 in one case. But the report also notes that contract maintenance sometimes is more economical.

## Display Uses Film Strip

Images for the new IBM 2760 display unit are provided by a film strip of up to 128 frames, not slides as reported in the April 10 issue of COMPUTERWORLD. The film strip, which may be in either color or black and white, is advanced by the computer and the user responds to questions by touching the screen with a light pen.

## Editorials

### Not A Good Precedent

Computer conferences are among the most important meetings of the year. Here the data processing community is updated on new events and new trends in the tools we work with. Here we are able to check on the development of previous promises, on the experience of others, and on the comparison between one item and another. Here we look for the total picture. And we are seldom disappointed.

Unfortunately, it looks as though we may be somewhat disappointed next December. The Fall Joint is being held in San Francisco and the exhibition area is the Brooks Hall, which has only half the space of the exhibition area in Atlantic City. This naturally puts a major problem in the hands of the organizers. They have to decide who is to go in and who is not.

They have decided to reallocate the available space that was used for various categories during the 1966 and 1967 joint computer conferences.

As a result, there will be 130 booths for working main frames, 113 for working peripherals systems, but only 12 for software services. Publications will have 15 booths, but time sharing services will have only 8.

These figures show that no account has been taken of the trends of the last few years. Main frames are certainly important, but they are not 16 times more important than time sharing services. Publications are important, but it is by no means clear that they are more important than software services. The decision, in short, has resulted in an unrealistic view of the field being almost inevitable and may well be giving unnecessary prominence to, for instance, time sharing services that are supplied by manufacturers of main frames, as compared with independent services.

It may still not be too late to try to get a second exhibition area. It may be too late. It may be that nothing can be done except one thing. It is certainly not too late to note that the basis for the decision taken in this case was a mistake. Historical precedent is a cherished principle of law, but it is not a valid one for allocating levels of importance to sectors of the dynamic computer field.

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## Measure for Measure

### How Useful Is Model 85's Maximum Operating Speed?

This is the third in a series of articles investigating claims made for the 360/85 by IBM.

To investigate IBM's claim that the 360/85 could execute instructions at a maximum rate of 12.5 million a second, COMPUTERWORLD looked at the instruction timings of the system. This showed immediately that any program which might be constructed to operate at this rate would have to be artificially created, because it would have to avoid branches, decimal arithmetic, storage instructions, and multiplies. In fact it could use only less than a quarter of the available codes. And it would have to do so without ever having to wait for storage interference.

No evidence was found in the Technical Report that such a program had been examined. So we could have finished the investigation there, and simply reported that it seemed unlikely that any useful program would operate at such a speed.

However, the function of our investigation, like the function of all of COMPUTERWORLD's Measure for Measure features, was to provide information useful to our readers. We felt that simply saying that no program would come up to this standard would not be really helpful unless we also gave some idea as to what sort of standard the programs would come up to, so that our readers could judge the importance of the discrepancies.

We therefore went back to the Technical Report and located three types of programs on which it reported. These are:

Access-dependent programs: sorts, assemblies, compiles.

Scientific programs: curve-fitting, heat transfers.

Decimal-based programs: Cobol object programs, other business oriented programs.

Then using the figures supplied by IBM in the Technical Report as to the efficiency of the 360/85 buffer arrangements and the improvement in performance due to the use of the high speed multiply unit, we made some calculations for each type of program to determine the maximum instruc-

tions/second rate at which it could operate consistent with the other published data. These calculations are not reproduced here, but will be sent to anyone who wishes to see them and who includes a self-addressed, postage paid envelope with the request.

#### Conclusions

The following instruction rates appeared to be the maximums on a 4-way interleaved Model 85 with no special features:

- 1) Access-dependent programs: 9 million insts/sec. (28% below)
- 2) Scientific programs: 7 million insts/sec. (45% below)
- 3) Decimal-based programs: 2 million insts/sec. (84% below)

It should be emphasized that these are only rough calculations designed to show the apparent maximum rate at which the IBM selected categories of programs might be simulated. No data as to their actual rate was available, so this remains unknown.

What these figures do show, however, is that there is a very great variation in the instructions per second measure.

#### Verdict

It may be true that a program could be constructed to work at the claimed maximum speed. However, nothing in the Technical Report or elsewhere suggests that any such program exists, or has been timed. It appears to COMPUTERWORLD that such a program would be artificial.

It also appears that in view of the very great variations which exist between categories of programs operating on the Model 85, as shown in the Technical Report, no reliance should be placed on the claim.

The claim as published is without value for a potential user wishing to evaluate the performance of his own work on the new system.

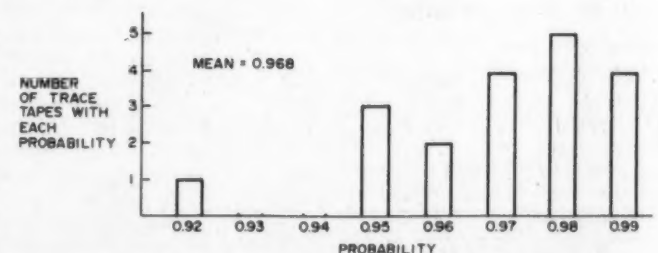
## How Often Are Instructions Found in Buffer Memory?

The third claim which we investigated was the statement that "the CPU will find the required data within the buffer memory 95% of the time."

This was a particularly important claim, because the buffer feature is the main difference between the 360/85 and other systems. The memory unit, the software, and the peripherals of the 360/85 are the same as those of the 360/75 - or even the 360/65. The improved performance is helped by the fast execution unit but is primarily due to the existence of the special (80 nsec) fast access buffer.

The important item stressed by IBM is the 85's ability to give fast access to data needed in the program. The authors of the Technical Report point out that in real life the data seeks in a program are not random; and they therefore have designed a fast-access buffer which holds up to 64 blocks of 64 bytes. If some data or an instruction is wanted the 360/85 first looks to see if it is held in the buffer and uses it from there if present. Only if it is not in the buffer does the program look for the data in the storage unit.

This greatly saves time, because the buffer is 12 times faster than the main core unit. If the claim that IBM makes, that 95% of the time the data will be found in the buffer, could be relied on while timing programs, it would be



This figure was used by IBM spokesmen to support the claim that the required data would be found in the buffer 95% of the time. In fact, it shows that only 19 tapes were examined (and about two seconds of 360/85 running time) and that sometimes the probability of finding the required data was significantly lower than the figure claimed.

possible to estimate the execution time of a processor-bound program without reference to core access time because while 95 buffer finds were being processed it might be possible to overlap the obtaining of five operands from main core.

But if the data were there less than eleven twelfths (or 95%) of the time, the core and not the buffer would be the limiting factor.

IBM at first said that the 95% figure was a conservative one, that in fact the correct figure was 97%. Pressed further they referred us to Figure 4 in the Technical Report as being the basis for the claim.

Figure 4, reproduced here, shows the frequency with which

the desired data was found in the buffer during the examination of about one minute of simulated running time of a series of some 11 programs which had been used by IBM to help design the buffer. The author of the Technical Report certainly did put an average mean figure of 97% on the chart. But no mention of this figure was made in the text, nor was it claimed that the numerical results shown were representative or could be used to guarantee the performance of the Model 85 on any other programs than the ones selected. Indeed, the furthest that the author of the Technical Report was prepared to go in interpreting the results summarized in the chart was to come to the quite

(Continued on Page 5)

## Viewpoint

# MAI Searches for Way To Cut Support Costs

When a firm enters a new field and starts selling computer peripherals in a more widely based manner than is currently found possible, what is the key problem which they put above the others?

Is it the marketing: the provision of a sales force ready to contact potential customers even if they are located in rural areas? Is it the costing of the product, so that it will remain competitive in

the years ahead and so bring a reasonable profit back? Is it the selection of the product, so that it scores sufficient "points" with the prospects? Or is it the commission structure so that the salesman will really work and get the product in?

## Their Answer

Any of these could have been the key element. But in the case

of MAI, COMPUTERWORLD learned on a recent visit, none of them was the key which made this company enter into selling plug-for-plug compatible tape units and to add disk drives as a second product. COMPUTERWORLD felt that users would be interested in knowing just what MAI did think was the important item, the key around which they were building their operation. So we asked them.

The answer was, "maintenance."

"Maintenance was the problem, and maintenance was what we were looking at very, very carefully."

"We could have got both our tape and disk drives a lot cheaper," Luther A. Schwalm, president of MAI said, "but we selected them based on our need for good and easy serviceability."

"Serviceability and maintenance are the name of this game. We are training all of our nationwide service force in the maintenance of both the tape units and the disk drives, just as we will be training them later in other products as we get them. And we will have more."

"Maintenance is the key item in our reports as we are choosing new products."

"If you look inside our tape drives — and then inside those that are working on your installation you can't help but see the difference," he added. "The same applies with our disk drives. The ones which you are accustomed to use hydraulics. And that means



MAI President Luther A. Schwalm makes a point during a discussion of his company's objectives.

training the maintenance people in a second technology. Ours use electric motors, and our people already know those skills."

## User Check-Point

The idea seemed persuasive, because before coming up to see Schwalm we had looked inside his tape units at a nearby customer's installation. We had been downstairs and had looked at his new MAI 2301 disk drive attached to his own System 360, and had compared the scene under the covers with the engineering of the IBM 2311 which stood alongside. But, while it looked pretty enough, we wanted to know whether it was for real. So we asked just how a user without much of an engineering insight could tell that MAI has taken such care with the maintenance problem.

"The user," said Whit P. Watson, MAI vice president for product planning, "can check our maintenance quality quite simply.

"He can simply look at the maintenance costs. If you look at our costs for maintenance, which we contract for anywhere in this country, you will find that they are lower than the maintenance charges of even the computer manufacturer."

"That is the evidence the user needs."

"It was an essential part of the product planning to see that we kept those maintenance costs both realistic, because we can't afford to subsidize them, and at a competitive, or better than competitive level," Watson said.

## Continuous Training

Although most of MAI's resources are still in the unit record area and in second generation computers, Schwalm said that MAI did have a considerable number of people who had experience in maintaining the 360s already onboard and that all the firm's engineers were keeping up with their training programs.

They are being trained in MAI's training schools on the tape units, and now on the drives. And MAI says that they will be trained on the new products which are coming out in the future.

So, that's one man's viewpoint. The important item, in his opinion, in the new plug-for-plug compatible trade won't be performance — or size of sales force — or beautiful styling.

He thinks that it will be maintenance. He may well be right.

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The new MAI 2301 disk drive sits between competitors' models at MAI's New York office.

## Letters to the Editor

### ACM Story Disputed

To the Editor:

Your "special correspondent's" report on the upcoming ACM presidential election which appeared in the April 17 issue left something to be desired in factual content and in nuance. The second paragraph read as follows:

"Of those who knew the names of one or the other of the candidates, the name of insurgent Richard Canning was brought up most often."

Canning seems to be the hope of the liberals, possibly mostly because he is bucking the tradition that says vice president Dr. Bernard Galler is automatically in line for the presidency."

The adjective "insurgent" is meaningless; both men were chosen by the nominating committee. The word "liberal" is irrelevant in this context. As for the tradition which is supposedly being bucked — none of the last three ACM vice presidents be-

came president. Moshman was defeated while Gilchrist and Bright declined to run.

J.F. Traub  
Bell Telephone Laboratories  
Murray Hill, N.J.

Our special correspondent was wrong. But not so wrong as reader Traub makes out. While vice presidents do not always succeed, academically oriented presidents (like Dr. Galler) are much more in the ACM tradition than publishers (like Canning) — and anyone who openly demands changes in the traditional meetings and publications is COMPUTERWORLD's idea of an insurgent. Ed.

Dennis E. Hamilton  
Univac Data Processing Div.  
Philadelphia, Penna.

P.S. ACM "Communications" just arrived, with position statements for each officer. It's enough for me to pick a slate even though certain statements are particularly vapid. The selective dissemination windmill is clearly impracticable and could be disastrous, so that has helped me also.

Dennis

## 85's Buffer 'Find' Rate Checked

(Continued from Page 4)

unexceptional conclusion that data needed by a program was not random. Moreover, the chart shows that one out of the 11 tapes examined had averaged well under the 95% figure.

### Verdict

The claim — critical to estimating the CPU performance of the 85 — is without solid justification.

If it is meant to indicate that all user programs will achieve a 95% find rate, it is disproved by the report.

If it means that an average program will produce a 95% rate, then COMPUTERWORLD feels that it was inadequately supported by the data in IBM's Tech-

nical Report on the 85. In particular, the use of the same programs to test the efficiency of the design as were used to create the design is unsatisfactory; and the number of programs reviewed was inadequate.

Before concluding this series we feel that IBM's reasons for using these figures should also, in fairness, be reported. IBM has told us of the basis for the claims and of the efforts they use internally to see that true and proper claims are made. Now we will tell you in the next part of this series.

We will also show you the documentation which shows that the claims as put forth by IBM can be misleading, and tell you of the standards which IBM apparently has forgotten to maintain.

### Election Apathy

To the Editor:

The current ACM elections leave me as apathetic as your present CW coverage indicates. Does Oettinger endorse a candidate? Is it Canning? Grosch is on the ballot, at least, but where are the position statements ordered by Oettinger at the August forum?

Ben Handy, L.A. region representative, was present at both forums and provided much of the constructive thought. He does not appear on the ballot for any national ACM position.

Many other positions, particularly for representatives, provide no contests.



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# ACM Elections Draw Closer

## Council May OK Changes

Informed sources have told COMPUTERWORLD that some of the suggestions that Richard Canning made in his position statement published in the April "Communications of the ACM" are not only backed by his opponent, Dr. Bernard Galler, but are about to be implemented if the recommendations of the Executive Committee of the ACM Council are approved, as expected, this week.

Specifically, the recommendations apparently include the placing of the "Journal" on a subscription basis, optional to the membership. No comment was available from the ACM prior to the conclusion of the council meeting as it considered that the council still had the right to amend or alter the proposals.

In the meantime, Canning in a statement to COMPUTERWORLD (printed alongside), emphasized the need for some debate or other technique to allow the ACM to handle the questions of the day, such as privacy.

## Canning Urges Better Coverage of Technical, Business Areas

*The following statement by Richard G. Canning, candidate for president of the ACM, although similar to his statement published in the April "Communications of the ACM" includes some additional thoughts. It was written in answer to an invitation from COMPUTERWORLD to candidates to provide statements for publication. Ed.*

Thank you for the invitation to express my views on ACM goals for the next two years — and what I would work for, if elected.

**Technical information:** Perhaps the main reason for ACM's existence is its function of supplying the membership with good quality technical information — through its publications, national conferences, professional development seminars, chapter meetings, etc.

I believe that we can and should do a better job in performing this function. In a dynamic field, we have to be more responsive to member interests, by searching out and meeting the needs for technical information.

Specifically, I would like to see our publication policies modified so as to identify technical areas that are not being adequately covered, and then to actively solicit the desired information. Passive calls for papers are not sufficient. We

should challenge our largest and most active special interest groups to take a bigger role in ACM's publications. These special interest groups are already taking this larger role in organizing sessions for national conferences; they can do it for publications.

In addition, I feel that new policies must be developed for the presentation of technical information at the national conferences. The reading of formal papers is an inefficient way to communicate. Panel sessions are often just excuses for reading full length but unrefereed formal papers. Better methods exist; it is up to us to use them.

**Debating potential changes:** I feel that ACM needs a vehicle for debating, among ourselves, the significant changes that are facing the computer field. (The phrase "among ourselves" is used to insure that ACM as an association does not attempt to lobby for proposed legislation — with potentially severe financial implications.) The field is facing such issues as the possible government regulation of time sharing services, the possible regulation of public (and private?) data banks, the possible separate pricing of hardware and software, and the possible licensing of programmers and analysts who work on systems operating in the public interest.

Issues such as these can directly affect a majority of us in the field. We need to debate these issues, to clarify their costs and their benefits — and via a medium that reaches the whole membership.

I feel sure that the results of these debates would be considered by policy-making bodies, when the issues were up for decision. Further, the same vehicle used for the debates could be used for expressing opinions on important social issues involving computers.

**The business community:** The business data processing community, representing over one-half of the computer field, is the largest user of data base systems. Important technical areas of data base systems are not being adequately covered in the literature and in meetings, by ACM or by other organizations. We need more quality technical information on methods of organizing large files, generalized file processing software, data communications, and similar subjects. ACM should take steps to more thoroughly meet this need through its regular information dissemination services.

Here, then, are areas to which I think ACM should direct a good share of its attention during the next two years. If elected, these are the goals toward which I would work. — R.G.C.

## Some Members Have Made Their Choice . . .

### She Thinks Galler Probably Will Win

Cautious optimism that Bernard Galler will get the ACM presidency was voiced by Rorrie Ratkevich, vice president of Arizona Computing Corporation, Los Angeles. An active member of ACM, Miss Ratkevich said she is not familiar with Richard Canning's record, but she knows Galler's record and feels that Galler will probably win the upcoming election.

Miss Ratkevich thinks an increase in membership dues would not be a particularly good idea, and that there is no need for reform of the existing ACM election process. On the subject of possible closer ties with Share, she said, "Share is big enough."

#### Favors Advertising

Revenue from commercial endeavors, such as the sale of advertising in ACM publications, would do no harm, Miss Ratkevich said.

Although she sees no need to alter the present heavily academic orientation of the society, Miss Ratkevich admits that she does not read every article every month. She considers the ACM publications a good source of reference material, particularly helpful when she is working on problems.

Asked whether ACM ought to take a stand in Washington, Miss Ratkevich responded, "I don't see why not. It could be representative" of the membership's feelings. Closer ties between ACM and DPMA might also do some good, Miss

Ratkevich believes, even though she places high value on the present scientific orientation of ACM. Existing publications of ACM are satisfactory for her purposes, and she would have no objection to enforcing software trademarks if possible.

#### She's Running

Miss Ratkevich does not belong to any other societies, but her activity within ACM is manifest. She is currently a candidate for secretary of her chapter's Special Interest Group on Programming Languages. She is running because she was approached and asked to run, she said. Miss Ratkevich reports that the ACM elections are really being talked about in her local chapter.

### He Sees Canning as Easy Winner

"I just can't see how anybody else can win!" With those words, Roy H. Lauren summed up his opinion of Richard G. Canning, whom he supports for election to the presidency of the Association for Computing Machinery. Here on the West Coast, Canning is relatively well known because of his publication, "EDP Analyzer," and because he has often spoken in public.

Canning will win by a landslide, in the opinion of Lauren, who is director of Advanced Systems Development at Security First National Bank in this city. Canning has often visited the ACM chapter here, and Lauren knows him.

#### Higher Dues?

ACM dues will have to be increased because of the higher cost of running the association, Lauren believes. This will mean that persons now belonging to two or more different societies might be obliged to drop one of their memberships, Lauren said.

Not enough members want to participate in the ACM election, he said. Something has to be done to make ordinary members

more interested, so they will want to vote.

The way to do this is to give the members more information about the issues, Lauren said.

The proposed Share tie-in is opposed by Lauren. He believes advertising and "head-hunting" can only demean the ACM publications. If it is necessary to increase the membership, the way to do it is to make ACM less academic than it today is. But Lauren would prefer to see the society remain well defined in scope.

#### National Lobby?

If there is to be a computer lobby in the nation's capital, it ought to consist, Lauren believes, of a panel of acknowledged leaders in the industry. He does not think ACM should be taking stands on issues in Washington.

ACM publications ought to pay more attention to management, because management pays the way in industry, Lauren said. The quality of the publications should be improved generally, he said.



R. G. Canning

## But Other Members Haven't Decided Yet

A man who has definite views on all the issues says that he thinks the choice between presidential candidates Bernard Galler and Richard Canning is a hard one to make. Galler is a university man who also understands the real world, but Canning has unquestioned capabilities. This is the dilemma perceived by Robert White, an active member of the Los Angeles chapter of ACM, who works for Advanced Information Systems, Informatics Inc.

If the dues are raised, ACM had better provide more services to make the dues worth paying, White contends. Dues should not, he feels, be higher than those paid by members of other societies.

White opposes close ties with Share or any similar group, but is in favor of accepting advertising in ACM publications other than the "Journal."

The academic image of ACM does not do the society any good and may be discouraging some potential members from joining, White said.

A stand by ACM in Washington he termed "essential." White also favors collaboration with other societies.

White is convinced that trademarks for software will become a reality, because the economics of the business will force software vendors to seek ways to protect their products.

Another ACM member who has not yet decided whether to vote for Canning or Galler for the presidency of the association, is Willard Olson of North American Rockwell. Olson knows Canning and Galler and thought Canning would be a better spokesman for ACM and has a better understanding of business.

Olson believes that ACM is capable of supporting higher dues. But he considers the issue of higher dues to be an administrative question which need not be voted on although it should be discussed fully.

A tie-in with Share would not be appropriate, in Olson's view, because overlapping could occur. But he feels that a

joint effort would be sensible in some areas because Share may lack full time office capability.

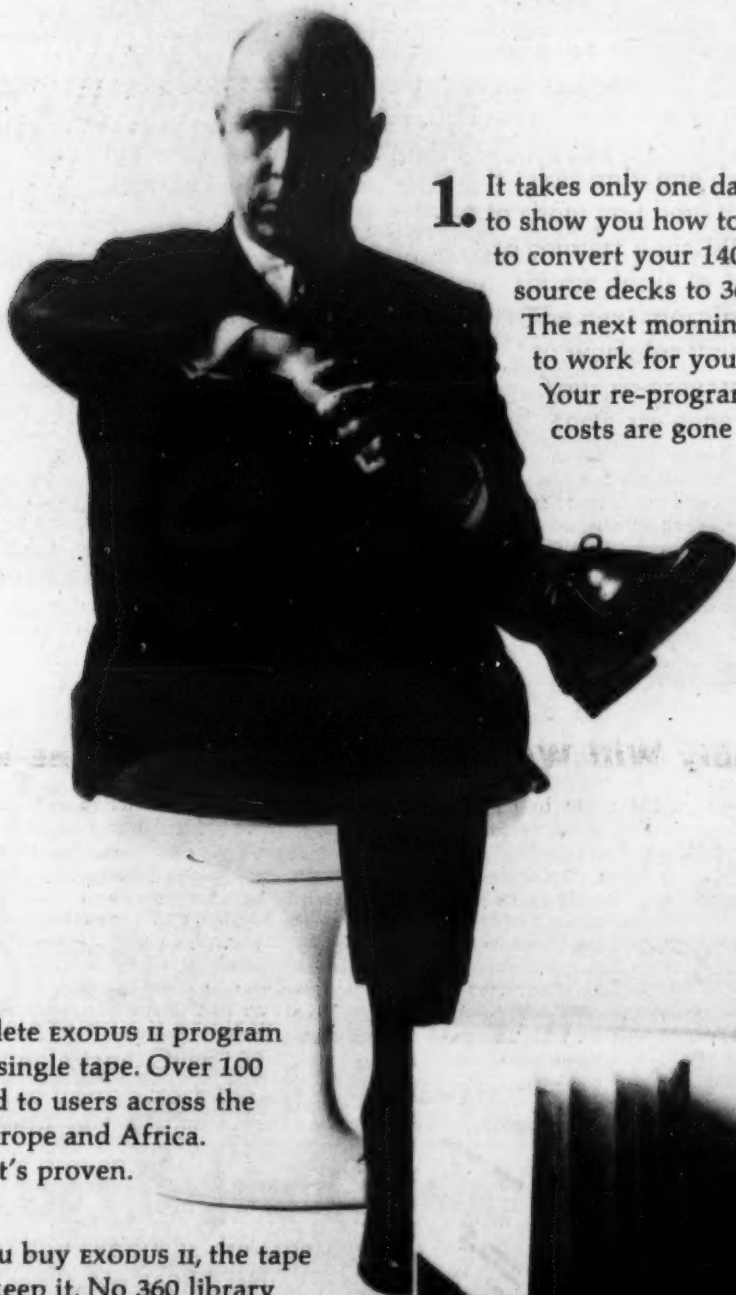
Olson does not object to introducing advertising in the "Journal" or increasing it in other ACM publications. However, he strongly opposes the sale of membership mailing lists for commercial purposes.

Olson is for having ACM make a stand in Washington. He suggests that the society should seek opportunities to appear, assuming that the purpose would be to support unfettered expansion of use of computers.

Collaboration with other societies should not be close, he said. Common projects and friendly relations are harmless, but each society ought to maintain its own flavor and not go over to a single joint meeting each year, Olson believes.

Olson contends that a world copyright ought to be sufficient protection for software and that cases of infringement are rare anyway.

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# N.Y. Automates Fingerprint File

ALBANY, N.Y. — The time it takes to identify fingerprints is being reduced from days to seconds by new computer methods. The New York State Identification and Intelligence System (NYSIIS) now searches fingerprint records by hand when requested by local police agencies to prepare suspect lists. By August, however, a system being tested will let the state's 3600 criminal justice agencies search a central NYIIS file of 1,200,000 prints and get a list back in six seconds.

Because no two impressions from different fingers have ever been found to be exactly the same, the fingerprint is an ideal means for identifying people. The current classification system uses information from all 10 fingers, and depends on identification of several different patterns and other characteristics.

It is possible, according to J.H. Wegstein of the National Bureau of Standards, for a fingerprint identification system to be based on only two details — ridge endings and bifurcations. Sets of descriptors can be computed and stored along with a label identifying the fingerprint on magnetic tape. A fragment of a fingerprint, such as occurs in a latent fingerprint, may also be used. A second computer program reads the descriptors corresponding to two different fingerprint impressions from the magnetic tape. A score is computed that indicates how well the two impressions match.



Fingerprint records from all over New York State arrive by wire at the Fingerprint Facsimile Transmission Center in Albany.

## Computer Handles Hospital Reports And Test Orders

BOSTON — As part of an increasingly wide range of information services designed for use by medical centers, it is possible for laboratory test orders and reports in hospitals to be processed by a computer assisted service.

Reportedly only one of a group of similar applications, the service is an extension of General Electric's Medinet operation based at Watertown, Mass. The hospital laboratory processing method was demonstrated at the New England Hospital Assembly at War Memorial Auditorium.

Terminal devices in the auditorium were linked during demonstrations to the Medinet computer center in Watertown.

### Growing Problems

The use of fingerprints was introduced in the New York State prison department in 1903. The 8" x 8" fingerprint card was first required in the state system in 1914, and has since become a fingerprint standard. During 1966 nearly 300,000 fingerprint requests were received from over 400 agencies.

The progressive growth of centralized fingerprint files has created several problems.

There has been the problem of devising a system of subdividing the millions of 10-finger cards into small enough groupings so that a particular card can be uniquely filed and then rapidly located without the name of the individual. Historically, the solution to this problem has been resolved by using classification systems that subdivide fingerprints into seven basic pattern types, and then obtaining further subdivisions. Although the resulting alphanumeric classification formula is usually adequate in smaller bureaus, the large bureaus find that filing and retrieval leave much to be desired.

### Direct Dial System

By January, 1969, the New



A fingerprint expert classifies a print at the New York State Bureau of Identification.

York computerized procedure will be used in all criminal cases in the state. Eventually a direct dial telephone system will link thousands more assorted state agencies to the system. Already changes are aimed at providing orderly transition from the existing manual system to a computerized system.

Specifically, facsimile transmission is aimed at reducing response time and improving service to user agencies. The first criminal justice facsimile transmission network has been initiated, first on a test basis and now as a permanent system. The network now permits rapid transmission of fingerprints from local

police (about 15 minutes) and rapid return of a summary criminal history (about 5 minutes). NYIIS will eventually be linked to the Federal Bureau of Investigation computer in the nation's capital.

The New York State Identification and Intelligence System has various responsibilities, such as data conversion and communication research, in addition to fingerprint identification. Gov. Nelson A. Rockefeller said the system "is gaining worldwide recognition because of its advanced thinking and application of modern technology to the war against crime."

# Complete Baseball Fact Book Planned

MIAMI — An encyclopedia of baseball statistics which would normally take five years to put together will instead be computer processed and published in about 15 months. The first edition of the Official Encyclopedia of Major League Baseball will be made available to the public in 1969, the centennial year of professional baseball.

The computer processed encyclopedia will be the first complete analysis of baseball statistics from 1869 to 1969. Much of the information to be included in the 1300

page work has never before been available.

Statistics compiled by researchers canvassing official and private record collections and old newspaper files in 30 cities will document results from over 107,000 games played by more than 10,000 players in the last 100 years.

The computer project is "the most ambitious and important undertaking in the history of baseball research," according to Lee Allen, historian of the Baseball Hall of Fame.

### Time Saved

Without a computer, it would take eight people five years to compute and check some eight million individual game appearances by players. But the same eight man staff, with the aid of one medium sized computer, will be able to do the same job in little more than one year.

Another important asset of the system besides speed and accuracy, is the ease with which computerized records stored on magnetic tape can be updated annu-

ally, eliminating tedious manual recalculations. The encyclopedia will be revised every three years.

Three techniques will be used to establish the accuracy of information:

(1) All modern statistics will be cross checked, insuring, for example, that batting records equal fielding records.

(2) Older, manually calculated records will be recalculated and cross checked.

(3) Statistics, particularly older ones, will be recalculated for "comparability." For instance, batting average for 1887 — a year in which bases on balls were scored as hits, and 13 men batted over .400 — will be recalculated so that they may be meaningfully compared with modern records.

Extensive fielding information, how players batted and threw, their height, weight, and place and date of birth and death will also be included.

The encyclopedia, the product of a data file assembled by Information Concepts, Inc., will be published by the Macmillan Co.

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## education

## McGraw-Hill Will Publish EDP Texts

MT. KISCO, N.Y. — Two firms from different fields have combined talents to combat the increasingly critical problem of educating people in computer usage.

McGraw-Hill, publishers, has signed a contract with Computer Usage Education, Inc. (CUE) here to publish a series of five college texts based on material developed by CUE.

Tentative titles for the "Computer Usage Series" texts are: "Computer Usage/Fundamentals," "Computer Usage/360 Basic Assembly Language," "Computer Usage/Applications," "Computer Usage/Fortran," and "Computer Usage/Cobol."

McGraw-Hill has international rights for the series and plans to market the texts worldwide. A spokesman for the publishing house said the series could be adopted as the basic text for most computer courses at the college level.

The CUE material is structured along the lines of a full curriculum in data processing, which would aid faculties in the process of developing their own programs for computer education. The series will include teachers' manuals and various other support packages for instructors.

## Advance Systems Seminar

A special one day introductory seminar will be presented by AIMS, Inc. of Cincinnati, Ohio, at the Marriott Twin Bridges Hotel, Washington, D. C., on Monday, Wednesday, Friday — May 13, 15, and 17.

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## Banker Calls for More Cooperation

CHICAGO — "I suggest that managers might open their doors a little wider to encourage — not just permit — responsible, technically trained people to evaluate the possibilities of where and how their scientific techniques could be applied."

David M. Kennedy, chairman of the board, Continental Illinois National Bank and Trust Company, made the statement as he received the second annual "Decision-Maker of the Year" award from the American Statistical Association, Chicago chapter.

Commenting on the increasingly sophisticated use of computers, Kennedy declared that their use "requires a clear management commitment to the advancement of computer techniques."

### Benefits Seen

"I believe such a commitment will produce great benefits."

"First, it will help managers to take part more fully in problem analysis, which should help them deal more effectively with particular problems."

"Second, and most importantly, this commitment will result in the passing on of knowledge and experience in the profitable use of the techniques themselves," he said.

Kennedy told how new computer techniques enable bank managers and others to reach decisions through structural models that create what-if situations.

"The character and functions of banking make the computer

particularly adaptable and valuable to banks," Kennedy said.

"It works just as effectively for the bank's internal needs . . . as it does for its customers."

"The result," Kennedy observed, "is that we have been moving closer toward a unification of technology and customer service."

### Paperwork Explosion

Kennedy noted that, with 20 billion checks flowing through the nation's banking system each year, the industry must ask "the basic question of to what extent and in what situations we need checks or similar paper documents."

"Will the move to an automated payments system (the checkless society) continue to be made gradually in the evolutionary sense, or will it rush to an abrupt jump with little or no softening transition?" he asked.

"It will be up to bankers to ease the shift by using all the communicative devices available to them."

One problem he noted was the "crucial matter of privacy . . . one of the perplexing barriers to the checkless society."

"The payments system may change rapidly to alter the traditional concept of a bank from a mover of paper to a mover of information," Kennedy said. To soften the impact of this change, Kennedy noted, "our critical resource in this revolution is and will be people to serve their communities and to be served in their turn."



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## Memorex Cited for Export Sales

SANTA CLARA, Calif. — Memorex Corp., manufacturer of precision magnetic tape and magnetic coated disks, has been designated by Secretary of Commerce C.R. Smith to receive President Johnson's Export "E" Award for its success in promoting foreign sales of U.S. products.

The company, founded in 1961, opened its international markets in 1964. In three years, export

sales volume has increased to one-quarter of total sales.

Memorex created an international organization to direct its efforts in overseas markets, and recruited its international sales force from the individual markets to achieve effective communications with buyers in all areas.

The company established a technical services facility in London to provide engineering assistance

for its large European market. The firm also has sales offices in ten major European cities.

Against competition from diversified manufacturers within foreign countries, Memorex emphasized product quality and technical know-how related to computer hardware, instrumentation recorders, and video tape recorders. The company also built a

record of prompt delivery through a worldwide communications system assuring first-day receipt of orders at Santa Clara, immediate delivery from stock at distribution centers, and air shipment to replenish stocks.

The "E" Award consists of a citation signed in the name of President Johnson by Secretary Smith; an "E" flag, and "E" lapel buttons.



W. J. Horne

## Horne Promoted At United Shoe

BOSTON — William J. Horne, a member of the DPMA Council, has been promoted to assistant vice president of the United Shoe Machinery Corp. and put in charge of the new Management Information Systems Department.

Horne, known for his appearances as a lecturer at various universities, has been with United Shoe for 28 years, almost a record for anyone in the data processing field.

Horne will report directly to Herbert W. Jarvis, the corporation president, who said:

"Horne's new position is a recognition of the expanding use of computer technology from the financial and administrative functions into the marketing, production, and general management control functions and the consequent need for prompt and in-depth coordination of USM's resources in this vital area."

### EDPeople

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Bruce C. Burley	Corporate Comptroller	Continental Computer Associates, Inc., Jenkintown, Penna.	Senior Accountant
W. Vernon Smith	Director, Market Planning & Research	Varian Data Machines, Newport Beach, Calif.	Product Line Manager
Charles M. Meerschaert	Marketing Manager	Control Technology, Inc., Long Beach, Calif.	Sales Engineer and Sales Manager
Michael Feuche	Editor in Chief	Moody's Computer Industry Survey, New York	Staff Member
A. Leonard Farrell	Sales Manager, Eastern Region	Vermont Research Corp., Boston	Field Sales Manager
Glenn E. Van de Veere	General Manager, West Coast Vocational College	Computing and Software, Inc., Panorama City, Calif.	Vice President and Director
Saul P. Steinberg	Board Chairman and Chief Executive Officer	Leasco Data Processing Equipment Corp., Great Neck, N.Y.	Founder
Bernard L. Schwartz	President and Chief Operating Officer	Leasco Data Processing Equipment Corp., Great Neck, N.Y.	Senior Vice President and Director
James F. Hudson	Manager, Software Development	Decade Computer Corp., Huntington Beach, Calif.	Staff Member, Scientific Software
			Price Waterhouse & Co.
			Beckman Instruments, Fullerton, Calif.
			Univac; Electrada Corp.
			Moody's Computer Industry Survey, New York
			Di/An Controls, Inc., Boston
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New York, Boston, and Washington, D. C.

## Informatics to Study CAB's File Structure Needs

Informatics Inc., Sherman Oaks, Calif., is under contract to the Civil Aeronautics Board (CAB), the government's regulatory agency for the air transport industry, to conduct a file structuring study consisting of an investigation into the CAB's current data and reporting requirements. The federal agency has purchased Informatics' Mark IV File Management System for the job.

Computer Usage Development Corp., San Francisco, has received a contract from the Wells Fargo Bank there to implement a trust tax system. The system calculates and prints United States and California fiduciary tax returns.

Programatics Inc., Los Angeles, has been awarded a contract to develop a computer simulator for Raytheon. The system, to simulate the Raytheon 730 computer, will run on the IBM 9020. Programatics is a consulting firm that specializes in supply of computer software and programming devices.

### NASA Contract

The National Aeronautics and Space Administration has awarded a \$2.7 million contract to Computing and Software, Inc., El Paso, for data processing services at the Goddard Space Flight Center, Greenbelt, Md. The con-



tract provides for on-site data reduction and computing services for Goddard's scientific divisions and laboratories. These services involve the processing of satellite telemetry data, prediction of satellite orbits and satellite systems simulations.

Raytheon Co., Lexington, Mass., has contracted to provide an electronic responder system for three classrooms at the United States Army Infantry School at Ft. Benning, Ga. The system consists of a student electronic response and registration recorder mounted on each student desk, a set of feedback meters on a master console located at the instructor's lectern, and a master magnetic tape recorder to serve all three classrooms.

Bunker-Ramo Defense Systems Div., Canoga Park, Calif., will conduct a tactical message and traffic analysis study under a \$736,000 contract from the Air Force Systems Command. The study will be conducted by the command's electronic systems division.

### Navy Systems

Planning Research Corp., Los

Angeles, has been selected as technical support contractor to the Navy Space Systems Activity. Under a \$908,000 contract, the firm will perform work involving advanced concept formulation, technical feasibility studies, and program planning.

Atlantic Software Inc., Philadelphia, through its Data Systems Div., will design and program a subcontractor financial and project control system (SUBCON) for Levitt & Sons, Inc., Lake Success, N.Y., home builders. The project will be implemented in IBM System/360 Cobol.

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# Cobol's Future in Danger, Editor Says

Arnold Keller, editor of Business Automation, in an editorial in his April issue gives his opinion that IBM's current policies on Cobol are threatening the continued use of the language. He claims that IBM's right to spend time and money developing PL/I should be subordinated to its duty to fully support Cobol.

Backing his forthright views, he gives details of the current wide use of Cobol, its progress towards standardization, and its superiority over any competitive lan-

guage introduced thus far. He also points out that many users of the language are unaware of the fact that it faces a serious challenge.

## IBM's Statement

The challenge comes from IBM's policies on languages, which were the subject of a speech by an IBM executive to one of the IBM users' groups last August (See CW, Aug. 30, 1967). This speech limited IBM's support of Cobol to "maintenance of [the] industry accepted stan-

dard," a phrase which gave rise to fears that if IBM cared to define its own Cobols as being necessary to the industry accepted standard, the action could lead to the immediate cessation of growth of the language.

A survey, referred to by Keller as showing that Cobol is in widespread use, quoted three individuals, all of whom have been active in the Cobol standardization effort for some years. Howard Bromberg gave a status report on the standardization effort, showing that the ability to keep up to date was being built into both the American and the international standardization efforts. Sy Berlin explained the responsibilities of the various standardization committees and contrasted the proved machine independence of the language.

(This formed an important contrast with the doubts Rep. Jack Brooks has expressed about the capability of PL/I in this regard.) He then looked to the next five years of Cobol development during which he sees the Cobol user being able to determine the adequacy of various implementations, and Cobol becoming a boon for the phased-in development of management information systems.

He also sees communications between programmers and operators becoming easier, but accepts the fact that the managers have been unable to readily understand Cobol programs, despite their "English" documentation.

Donald Stanford, an actual user, the chairman of the joint Share/Guide Project, is also quoted as feeling that Cobol is best for the user.

The article cites an IBM spokesman as saying, "Our past record of Cobol support and our continuing Cobol efforts should refute this concern" that PL/I support plans may adversely affect company support of Cobol.

However, a prominent user was quoted as saying that little support had been given over the past year, and that they had been expected to accept platitudes, postponements, and edicts of procrastination.



COMPUTERWORLD

software

## Extended Mod 1 (MSR) Offered to H200 Users

WELLESLEY HILLS, Mass. — An operating system to allow multiprogramming on some of the larger medium-scale Honeywell Series 200 computer systems at a lower cost has been announced.

The system, called Extended Mod 1 (Mass Storage Resident), permits the user to handle batch processing jobs in one mode (background) while media conversion or data communications from remote locations is being executed in the other mode (foreground).

An example would be processing an accounts payable routine in the background while an inventory update from remote warehouse locations runs in the foreground. Each runs independently of the other with segments of core memory fully protected and allocated for each routine.

Hardware configuration required for Extended Mod 1 (MSR) includes a Model 1201, 1251, or 2201

central processor with a minimum of 49,152 characters of core memory, disk pack drives or disk files, card reader, line printer, typewriter console, and three one-half-inch magnetic tape drives.

Extended Mod 1 (MSR) also enables users of the magnetic tape-oriented Mod 1 (TR) operating system to run his programs in the background and add disk oriented applications for foreground processing.

Because of the protection features of the supervisor in Extended Mod 1 (MSR), existing user-written programs need little or no modification to run in a foreground/background environment.

The Extended Mod 1 (MSR), to be available with the delivery of computer systems in late 1968, is based on Mod 1 (MSR) which has been fully tested and debugged and is currently in use on several medium-scale Honeywell systems.

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Requires five to seven years of experience in the commercial computer field. You should be familiar with the interface presented by typical processors and peripheral equipment.

### ELECTRONIC ENGINEERS

Duties will include the design of logic and digital circuitry. The position requires three to five years of professional experience in display systems.

### PRODUCT DESIGNERS

You will design commercial electronic equipment working from concept layouts and sketches. A background in lead designing with a minimum of five years of experience is needed.

### PROJECT ENGINEERS

Can you design and develop peripheral, terminal, and display subsystems for medium and large computer systems? You will need four to six years of experience in logic and circuit design, including switching and telecommunications.

### SYSTEM TEST ENGINEERS

Manufacturing Department has immediate opportunities for test engineers with experience in system testing and inspection. A thorough knowledge of digital techniques and solid-state electronics is necessary.

## MARKETING OPPORTUNITIES

### SYSTEMS ENGINEERS

You can define as well as solve problems and have the unique ability to understand a custo-

mer's needs, here is an opportunity to develop new computer applications through improved display systems. You must be experienced in program and systems analysis on medium and large-scale general-purpose computers such as IBM 360, UNIVAC 490 and G.E. 400-600 series and familiar with real-time applications. Your responsibilities will range from systems and programming support to customer indoctrination.

### SALES REPRESENTATIVES

Your position will be more than selling or leasing the 720 Display and peripheral devices; you will be expected to analyze customer needs, define problems and propose solutions. This means you must be a creative salesman in the true sense. And you must be thoroughly familiar with third-generation hardware capability and experienced in selling computers, interface equipment and CRT displays. The finest sales plan in the data processing industry, coupled with the technical excellence of the Sanders display product line, assures high income potential.

### FIELD SERVICE ENGINEERS

If you have the technical competence to install and troubleshoot display systems and the presence to effectively indoctrinate customer personnel and provide technical support to sales representatives, here is a unique career opportunity. Your background must include recent experience with digital and analog circuitry. Experience in classroom instruction would be helpful.

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CALL (609) 344-7186, ext. 201, May 2, 3, and 4 to arrange an immediate interview with Mr. B. D. Currie Sr.

OR WRITE him at Sanders Associates, Inc., Dept. 419 CW, 95 Canal St., Nashua, N.H. 03060 if an interview in Atlantic City would not be convenient.

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### Autocoder to 360 DOS-BAL

Program converts 1401 Autocoder source statements into IBM 360 DOS-BAL source statements. It is about 97% effective on typical 1401 tape programs.

Implemented for 360 with 32K or larger. Written in DOS-BAL.

Price: Upon Request

Contact: Karl A. Fugal  
 1536 East 1220 North  
 Logan, Utah 84321

### 360 Payroll System

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Series of 23 programs which process hourly and salaried payrolls in a multi-company environment. Liberal deduction capabilities. Full labor distribution reporting. Complete file maintenance facilities. Excellent documentation. Runs on IBM 360 with 32K and two 2311 Disk Drives. This system is now being used and has proven highly successful. Price: \$3,000

Contact: Business Information Systems, Inc.

Times-Chronicle Building  
 Jenkintown, Penna. 19046

### 360/20 Documentation Aid

Program is designed to list and analyze Model 20 commercial applications. For each procedure it lists fourteen events, and analyzes seven of them. Some of the topics covered are: application category, program type, core use, run time, report distribution, and multi-procedure use. Implemented for 360/20 8K, written in RPG.

Price: Upon Request

Contact: Edward W. Helgeson  
 Pepsi-Cola General Bottlers, Inc.  
 1745 North Kolmar Avenue  
 Chicago, Ill. 60639

### GIANT - General Information and Analysis Tool

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Contact: B. Rasmussen  
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 Denville, N.J. 07834

### PAYROLL SYSTEM

Series of programs which compute payroll on a modular basis. Handles multi-companies. Produces — checks — journal — distribution — deduction register — earnings record — 941A — W2. Will handle most payrolls. Runs on IBM 360 — Mod 30 — 32K Disk — BAL — Price: \$3000.00

Contact — Thomas Tierney  
 American Computer Leasing  
 1 East Fourth Street  
 Cincinnati, Ohio  
 (513) 621-6585

### PAY RATE CALCULATIONS

Program calculates 24 and 26 pay period amounts and hourly rates for annual salaries between \$3000 and \$16,000 at \$10 intervals. (Can be adjusted to other range or intervals). Implemented for IBM 1401, 4K storage. Price: Upon Request.

Contact: William Cornwell  
 102 St. Johns Road  
 Shiremanstown, Penna. 17091

### UNIVAC 1005 IMPLEMENTATION PACKAGE

Includes conversion from Univac 1004 emulator source statement to 1005 object code using a two path assembly system which can be used independently after conversion.

Price: Upon Request

Contact: B.W. Godfrey  
 Computer Systems  
 1368 Lincoln St.  
 San Rafael, Calif.

### COBOL ANALYZER

The COBOL ANALYZER provides a cross reference of all data and paragraph names in an S/360 COBOL program. It lists the paragraph name, compiler sequence number, and COBOL verb in which a data or paragraph name is used. The ANALYZER consists of one BAL program, one COBOL program, and one sort. Requires 32K memory.

Price: \$250

Contact: DATAWARE INC.  
 959 Kenmore Avenue  
 Kenmore, N.Y. 14216

### COBOL-AID

A cross reference aid for System/360 programs. For use with individual or multiple program. COBOL-AID analyzes the Procedure Division of COBOL source programs. Every data name, literal and library name is cross-referenced by page and line number. Package includes 3 COBOL source programs and 2 IBM DOS sort programs with job control.

Price: \$350

Contact: Computer Results Corp.  
 1680 Riverdale Rd.  
 W. Springfield, Mass.

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## financial

## New Registrations

**AUTOMATION SCIENCES, INC.**, 215 14th St., Jersey City, N.J., a company which provides computer systems analysis and programming services, filed a statement to register some 250,000 outstanding common. Proceeds from the offering, at \$4 per share, will go to selling stockholders. The underwriter is Mayflower Securities Co., Inc., 32 Broadway, New York.

**COMPAC COMPUTER SYSTEMS, INC.**, 911 Hennepin Ave., Minneapolis, a company involved in the design and operation of computer programs, filed to register some 100,000 common ("Reg.A"). Proceeds from the offering, at \$2.30 per share, will permit equipment acquisition and will supply working capital. The underwriter has yet to be named.

**COMPUTERIZED AUTOMOTIVE REPORTING SERVICE, INC.**, 12 Office Park Circle, Birmingham, Ala., a data processing service bureau for automotive dealers, filed a statement to register some \$1 million of 6% convertible subordinated debentures due 1978. Proceeds from the offering, at 100%, will be used for debt repayment and will furnish working capital. The underwriter is Myron A. Lomansky, 67 Broad St., New York.

**DATA SYSTEMS ANALYSTS, INC.**, Cooper Parkway & N. Park Dr., Pennsauken, N.J., a company engaged in systems analysis and computer programming, filed to register some 120,000 common. Proceeds from the offering, at \$5 per share, will be used for debt repayment and will furnish working capital. The underwriter for this new issue is Graham Loving & Co., 111 Broadway, New York.

**DIALSCAN SYSTEMS, INC.**, 80 E. 42nd St., New York, a company involved in the development and sale of an automatic and semiautomatic "voice retrieval system" filed to register some 100,000 common. Proceeds from the offering will provide working capital. The underwriter is Myron A. Lomasney & Co., 67 Broad St., N.Y.

**FACTSYSTEM, INC.**, 612 N. Michigan Ave., Chicago, a company which provides programming and educational services in the computer industry, filed to register some 125,000 common and 125,000 common purchase warrants, to be offered in units of one share and one warrant. Proceeds from the offering, at \$4 per unit, will be used for debt repayment and will furnish working capital. The underwriter is Alessandrini & Co., 11 Broadway, N.Y.

**UNIVERSITY COMPUTING CO.**, 1300 Frito Lay Tower, Dallas, a company which leases data processing equipment and offers data processing services, filed to register some 259,793 common of which 69,793 are to be offered by selling stockholders not part of company management. Proceeds from the offering will furnish capital for its 1968 capital expenditure program, most of which is accounted for by the planned expansion of its computer utility network. The underwriter is Kidder, Peabody & Co., 20 Exchange Place, N.Y.

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## Control Data, Randolph Earnings Up 176%, 159%

MINNEAPOLIS — Control Data has announced results for the nine months ended March 31, 1968.

Net earnings rose 176% from \$4,850,383 during the nine month period in 1967 to \$13,379,580 during the latest period.

Net earnings per share of common stock increased from \$.52 to \$1.56. This was distributed by quarters as follows: first quarter — \$.50 (vs \$.02); second quarter \$.51 (vs \$.14); and third quarter, \$.55 (vs \$.36).

Sales, rentals, and service income increased 47%, from \$179,242,777 to \$263,651, 133.

Figures give retroactive effect to the results of acquisitions made during the latest period.

### Financial Items

NEW YORK — John M. Randolph, president of Randolph Computer Corp., has announced a 159% increase in earnings for the first quarter ended March 31, 1968. Earnings amounted to \$726,000 vs. \$280,000 for the same period last year. Earnings per share increased from \$.23 to \$.38 in the face of a 56% jump in the average number of shares outstanding.

Revenues gained 114%, moving from \$1,929,000 in 1967 to \$4,737,000 during the 1968 quarter.

Randolph also revealed the company has 162 computer systems on lease to 79 customers and that during the second quarter of 1968 the aggregate purchase price of all the IBM System/360 computers owned by Randolph will pass the \$100 million mark.

SHERMAN OAKS, Calif. — Informatics, Inc., which specializes in the design, programming and support of computer based systems, has announced results for the fiscal year ended March 30, 1968.

Net income rose 42%, from \$279,020 to \$396,788, and revenues increased 22% from \$6,427,558 to \$7,868,204. Per share earnings increased from \$.51 to \$.70.



# TLW

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April 23, 1968

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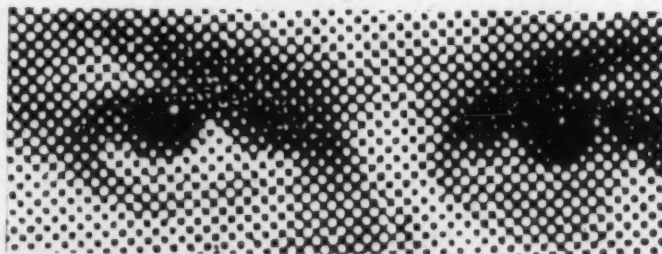
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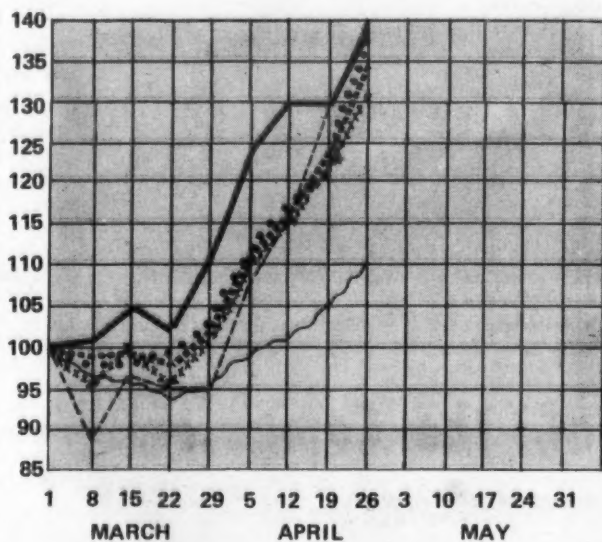


COMPUTERWORLD

## financial

## Computer Stocks Trading Index

- ..... Computer Systems  
 ..... Peripherals & Subsystems  
 ..... Supplies & Accessories  
 ..... Software & EDP Services  
 ..... Leasing Companies  
 \*\*\*\*\* CW Composite Index



## Index Gains 7.4%; SSI Moves Up 83%

(Continued from Page 1)

130-1/2. Digital Equipment rose 10% to 153, down only slightly from its new high of 153-1/8. A similar 10% gain was made by NCR which closed at 137-1/2 after reaching a high of 139-1/2. Hewlett-Packard closed at its new high of 81-7/8, up 12%. Scientific Controls continued to outpace other stocks in the sector, gaining 14% to close at 44-1/2. The stock has risen 98% since March 1, the biggest gain made by any computer stock in that period. Collins Radio was the only stock in the sector to lose ground, being off 2% to 80-1/2. Systems Engineering Labs stayed even at 27-3/4.

Alphanumeric, the usual big gainer in the Peripherals and Subsystems Sector, was found lagging behind gains made by others in the sector last week. The stock was up 10% to 124 (94% over March 1). Both Bolt, Beranek & Newman and Rixon Electronics gained 12%, up to 23-3/4 and 23 respectively. Data Products which lost 10% in the previous week, gained 14% last week. The other stock in the sector which had lost ground previously, Calcomp, also showed a substantial gain. It was up 15% to 43-3/4. Fabritek, previously the only stock in the sector at a level below the March 1 base, showed the biggest gain and was up 18% to 11-3/8 (14% above the March 1 base). Photon and Mohawk Data Sciences were the only issues in the sector which lost ground last week. Photon was off 1% to 91, and Mohawk Data, in a week which saw three other companies (IBM, Sangamo, and Community) offer keyboard-to-tape devices in competition with its own Data Recorder, lost .89%, closing at 167.

Gains of more than 10% were made by four companies in the Supplies and Accessories Sector. Wallace Business Forms gained 11% to 30-1/4; Reynolds & Reynolds was up 12% to 36; Barry Wright closed at 33-3/4, up 15% after reaching a new high of 34-3/8; Adams-Millis, whose stock will be split shortly, gained 17% to close at 53-7/8. Only Memorex and Moore Business Forms lost ground. Memorex was off 1% to 65-1/2 and Moore lost 3%, closing at 31.

A spectacular increase of 82% was made during the week by Software Systems, Inc. (SSI). The stock moved from 8-1/2 to 15-1/2. A company spokesman told CW that no significant information had been released by the company recently and he knew of no comments in the press concerning the company which might have increased interest in the stock. He did, however, note that the stock market in general was "thin." Brandon Applied Systems, which had risen 53% the previous week, didn't move at all last week. It closed at 16-1/2. However, five other stocks in the Software and EDP Services Sector showed gains of more than 10%. Informatics was up 11% to 60; Computer Sciences gained 12% to close at 51-1/4; both Computer Applications and Applied Data Research gained 16%. Digitek, one of three stocks in the sector which had recently closed below the March 1 base until last week's trading, The stock moved up 23% to 14-1/2. TBS Computing Centers, the third below-base stock, continued to fall, losing 22% in the week, and closing at 15-1/4.

## COMPUTER STOCKS: TRADING SUMMARY

Week Ending April 26, 1968

EXCHANGE	BASE PRICE 3-1-68	WEEK AGO CLOSING PRICE	CLOSING PRICE	COMPUTER SYSTEMS	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
NYSE	163 3/8	202 7/8	208	Burroughs	+ 5 1/8	+ 2.53	+ 27.31
NYSE	67 3/4	82 1/4	80 1/2	Collins Radio	- 1 3/4	- 2.13	+ 18.82
NYSE	101 1/2	141 1/2	149 3/4	Control Data	+ 8 1/4	+ 5.83	+ 47.53
AMSE	102	138 3/4	153	Digital Equipment	+ 14 1/4	+ 10.27	+ 50.00
NYSE	87 1/4	93 5/8	95 3/8	General Electric	+ 1 3/4	+ 1.87	+ 9.31
NYSE	60	72 3/4	81 7/8	Hewlett-Packard	+ 9 1/8	+ 12.54	+ 38.46
NYSE	93 1/8	122 1/8	129 3/4	Honeywell	+ 7 5/8	+ 6.24	+ 39.32
NYSE	577	636 1/2	659	IBM	+ 22 1/2	+ 3.33	+ 14.21
NYSE	103 7/8	125	137 1/2	Nat Cash Register	+ 12 1/2	+ 10.00	+ 32.37
NYSE	78 1/4	81 1/8	82 1/8	RCA	+ 1	+ 1.96	+ 11.20
NYSE	46 7/8	93 7/8	97	Raytheon	+ 3 1/8	+ 3.33	+ 23.96
OTC	22 1/2	39	44 1/2	Scientific Controls Corp.	+ 5 1/2	+ 14.10	+ 97.78
NYSE	118 1/8	154 1/2	160	Scientific Data	+ 5 1/2	+ 3.55	+ 35.44
NYSE	45	52 1/8	55	Sperry Rand	+ 2 7/8	+ 5.51	+ 22.22
OTC	22 1/2	27 3/4	27 3/4	Systems Engineering Labs	-	-	+ 23.33
EXCHANGE	BASE PRICE 3-1-68	WEEK AGO CLOSING PRICE	CLOSING PRICE	PERIPHERALS & SUBSYSTEMS	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
NYSE	58 3/8	64 1/4	69 1/4	Addressograph-Multigraph	+ 3	+ 7.78	+ 18.63
OTC	64	113	124	Alphanumeric	+ 11	+ 9.73	+ 93.75
NYSE	29	30	32 1/8	Ampex	+ 2 1/8	+ 7.08	+ 10.78
OTC	17 1/4	21 1/4	23 3/4	Bolt Beranek & Newman, Inc.	+ 2 1/2	+ 11.76	+ 37.68
AMSE	13 1/2	14	14 7/8	Bunker-Ramo	+ 7/8	+ 6.25	+ 10.19
AMSE	32 1/8	38 1/8	43 3/4	Calcomp	+ 5 1/8	+ 18.75	+ 38.19
OTC	15 1/4	15 5/8	17 7/8	Data Products	+ 2 1/4	+ 14.69	+ 17.21
OTC	19 1/4	21 1/2	21 3/4	Digicom	+ 1/4	+ 1.16	+ 12.99
OTC	39	47 3/4	50	Electronic Memories	+ 2 1/4	+ 4.71	+ 28.21
OTC	10	9 5/8	11 3/8	Fabritek	+ 1 5/8	+ 18.18	+ 13.73
OTC	34	50	55	Gerber Scientific	+ 5	+ 10.50	+ 61.76
AMSE	16 7/8	19 3/8	24 3/8	Milgo Electronics	+ 5	+ 25.81	+ 44.44
NYSE	115 1/8	168 1/2	167	Mohawk Data Sciences	- 1 1/2	- 0.89	+ 45.06
OTC	74	110	121	Optical Scanning Corp.	+ 11	+ 10.00	+ 63.51
OTC	72	92	91	Photon	- 1	- 1.09	+ 26.39
AMSE	25 5/8	26 7/8	29 3/8	Potter Instrument	+ 2 1/2	+ 9.30	+ 14.63
OTC	40 1/4	71 1/2	77 1/2	Racognition Equipment Corp.	+ 8	+ 8.39	+ 92.54
AMSE	16	20 1/2	23	Rixon Electronics	+ 2 1/2	+ 12.20	+ 43.75
NYSE	46 1/8	50 1/2	54 3/4	Sanders	+ 4 1/4	+ 8.42	+ 18.70
OTC	40 1/2	43 1/2	47 1/2	Tally Corp	+ 4	+ 9.20	+ 17.28
NYSE	242 1/4	266 1/2	282	Xerox	+ 15 1/2	+ 5.81	+ 36.41
EXCHANGE	BASE PRICE 3-1-68	WEEK AGO CLOSING PRICE	CLOSING PRICE	SUPPLIES & ACCESSORIES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	48 1/2	50	51	Acme Visible	+ 1	+ 2.00	+ 5.15
NYSE	41	46	53 7/8	Adams-Millis	+ 7 7/8	+ 17.12	+ 31.40
OTC	13 5/8	16 3/8	17 1/4	Baltimore Business Forms	+ 5/8	+ 3.76	+ 26.61
AMSE	27	29 3/8	33 3/4	Barry Wright	+ 4 3/8	+ 14.89	+ 25.00
OTC	27 1/4	28	28 3/4	Ennis Business Forms	+ 3/4	+ 2.68	+ 5.50
NYSE	84 1/8	93 1/2	102 3/8	SM Company	+ 8 7/8	+ 9.49	+ 21.69
OTC	58	66 1/2	65 1/2	Memorex	- 1	- 1.51	+ 12.93
TOR	27 1/4	31 7/8	31	Moore Business Forms	- 7/8	- 2.75	+ 13.76
NYSE	57 1/4	64 1/8	66 7/8	Mathia Corp.	+ 2 3/4	+ 4.29	+ 16.81
OTC	31 1/4	32	36	Reynolds & Reynolds	+ 4	+ 12.50	+ 15.20
OTC	34 1/2	26 1/4	27	Standard Register	+ 3/4	+ 2.86	- 21.74
NYSE	37 3/4	35	35 1/2	Uarco	+ 1/2	+ 1.43	- 5.96
AMSE	14 1/4	17 3/8	18 5/8	Wabash Magnetics	+ 1 1/4	+ 7.19	+ 30.70
OTC	25 3/4	27 1/4	30 1/4	Wallace Business Forms	+ 3	+ 11.01	+ 17.47
EXCHANGE	BASE PRICE 3-1-68	WEEK AGO CLOSING PRICE	CLOSING PRICE	SOFTWARE & EDP SERVICES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	17	22	25 1/2	Applied Data Research	+ 3 1/2	+ 15.91	+ 50.00
OTC	15 1/2	19	20 1/2	Aries	+ 1 1/2	+ 7.89	+ 32.26
AMSE	47	56	55 3/4	Automatic Data Processing	- 1/4	- 0.45	+ 18.62
OTC	9	16 1/2	16 1/2	Brandon Applied Systems	-	-	+ 83.33
AMSE	22 7/8	26 1/8	30 1/4	Computer Applications	+ 4 1/8	+ 15.78	+ 32.24
OTC	30	40	40	Computer Network	-	-	+ 33.33
AMSE	40	45 5/8	51 1/4	Computer Sciences	+ 5 5/8	+ 12.33	+ 28.13
OTC	39	44 3/4	43 1/2	Computer Usage	- 1 1/4	- 2.80	+ 11.54
OTC	36 1/2	51 1/2	53 1/2	Computing and Software	+ 2	+ 3.88	+ 46.57
OTC	12 1/2	11 3/4	14 1/2	Digitek	+ 2 3/4	+ 23.40	+ 16.00
AMSE	38 3/8	40 1/8	42 3/4	Electronic Computer Prog. Inst.	+ 2 5/8	+ 6.54	+ 11.40
OTC	35	54	60	Informatics	+ 6	+ 11.11	+ 71.42
OTC	11 1/2	12 1/2	13 1/2	National Computer Analysis	+ 1	+ 8.50	+ 17.39
AMSE	31	39 1/2	42 5/8	Planning Research	+ 3 1/8	+ 7.91	+ 37.50
OTC	9	8 1/2	15 1/2	Software Systems	+ 7	+ 82.35	+ 72.22
OTC	20-1/2	19 1/2	15 1/4	TBS Computing Centers, Inc.	- 4 1/4	- 21.80	- 25.61
OTC	63	84	92	University Computing	+ 8	+ 9.52	+ 46.03
EXCHANGE	BASE PRICE 3-1-68	WEEK AGO CLOSING PRICE	CLOSING PRICE	LEASING COMPANIES	WEEK NET CHANGE	WEEK % CHANGE	% CHANGE FROM BASE
OTC	19 1/4	22 3/4	25	Chandler Leasing	+ 2 1/4	+ 9.89	+ 29.87
OTC	25 1/8	28 1/2	33 3/4	Computer Leasing	+ 5 1/4	+ 18.42	+ 34.32
AMSE	12 1/4	14 1/2	18	Cyber-Tronics	+ 3 1/2	+ 24.14	+ 46.93
AMSE	106 5/8	120 1/4	131	Data Proc. Financial & General	+ 10 3/4	+ 8.93	+ 22.86
OTC	12 1/2	10 3/4	12 5/8	Datronix Rental	+ 1 7/8	+ 17.44	+ 1.00
OTC	20	25	28 1/2	Leasern Computer	+ 3 1/2	+ 14.30	+ 42.90
OTC	13 1/4	13 5/8	16 1/4	EPA, Inc.	+ 2 5/8	+ 19.27	+ 22.64
AMSE	28 3/4	36	42 1/2	OC Computer Corp.	+ 6 1/2	+ 16.05	+ 47.85
AMSE	98	138 1/2	147 1/2	Leasco	+ 9	+ 6.49	+ 30.51
AMSE	45 7/8	80	85 1/2	Levin-Townsend Computer Corp.	+ 5 1/2	+ 6.87	+ 96.38
OTC	10 1/2	12 1/2	7	LNC Data, Inc.	- 3	- 30.00	- 33.34
OTC	10 7/8	12 1/2	13 3/8	Management Assistance	+ 7/8	+ 7.00	+ 22.98
AMSE	41 5/8	41 1/8	46	National Equip. Rent.	+ 4 7/8	+ 11.85	+ 10.51
AMSE	38	51 1/2	59	Randolph Computer Corp.	+ 7 1/2	+ 14.56	+ 55.26
AMSE	10 7/8	13 1/8	14	U.S. Leasing	+ 7/8	+ 6.66	+ 28.73

\* Companies included in Computerworld's stock trading index for each sector.

### Wall Street's View

## 155 Objective Seen For NCR, DPF&G

NCR - Bache & Co.'s technician reports NCR appears ready to break out of a short term flag pattern. A close above 130 would take NCR out of the pattern and additional positions would then be warranted, he advises. An upside objective for the stock appears to be the 150-155 range, and the issue's chart pattern reveals meaningful support in the 120-125 zone.

DATA PROCESSING FINANCIAL & GENERAL - Philips, Appel & Walden's chartist notes a "head and shoulders" reversal with a "neckline" of 125 has been formed by DPF&G. Purchases are recommended at current levels or on any dip to 125, and a protective stop should be placed at 123-7/8. The stock's objective is 155-160.

ADDRESSOGRAPH-MULTIGRAPH - Abbott,

Procter & Paine notes that A-M is selling at less than 20 times estimated fiscal 1969 earnings and is in the bottom half of the 1967-68 price range. It recommends A-M for growth accounts desiring participation in the office equipment field.

RCA - Courts & Co. reports that progress is continuing in RCA's computer operations, and that this division should begin to contribute to profits in the early 1970's. Courts notes that RCA is selling in the lower area of its P/E range for the past five years, and suggests that it offers attractive medium term growth potential for the conservative investor.

AMERICAN RESEARCH & DEVELOPMENT - F.S. Mosley chartists had previously suggested the stock for acquisition for the duration of the current rally, and notes it appears to have speculative merit.

## B300 to Automate City Hall Services

The City of Huntington Beach, Calif., has installed a Burroughs B300 electronic data processing system to automate several city hall services for its 85,000 citizens. The leased system is processing utility billings, payroll, licenses, general ledger, and other

accounting functions. City planning functions will be added to the system later.

Dynair Electronics, Inc., San Diego, Calif., designer and producer of equipment used in television broadcasting, has acquired a Sperry Rand Univac 9200 com-

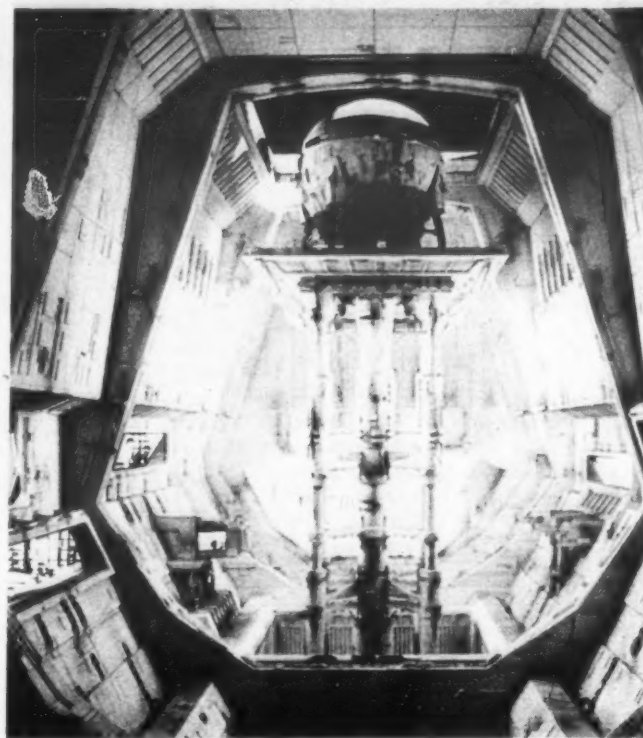
### Orders and Installations

puter system for inventory control, sales forecasting, job cost analysis, payroll, and personnel records.

Hebrew University, Jerusalem, Israel, has purchased a large Control Data 6400 computer system for use in teaching, administrative planning, and a variety of scientific research applications. Scheduled for installation in July, 1968, the 6400 will be the most powerful computer system in Israel. The university plans to add CDC 6612 Visual Entry/Display Stations and CDC 200 User Terminals at a later date.

Honeywell has opened a data processing center in Rome to provide computer service to businessmen in central Italy. The Rome center, the second in Italy, has a Honeywell Model 1200 computer system.

Optek, Inc., Costa Mesa, Calif., will install a Scientific Data Systems Sigma 5 computer in June, to handle manufacturing data processing requirements. Optek is endeavoring to integrate computer usage into every aspect of its business.



An Aries spacecraft is lowered into the Clavius base station in a scene from the movie "2001: A Space Odyssey."

## Hal, the Computer, Fares Badly in '2001'

It is no good to review a play when your prime interest is in one of the players. The actor who gets a particular role is, of course, completely helpless in the author's hands. He may have a good role; he may have a bad one. He may be able to do something with it, but more frequently — particularly if it is a bad one — he can't do anything to improve it.

This was the most unfortunate position of the leading actor in the movie "2001: A Space Odyssey," produced by Cinerama.

It is the story of a weak and worried computer who tries to take over a spaceship which he apparently completely controls.

The spaceship is on its way to Jupiter to look at some forms of nonhuman intelligence which, apparently, were based there. Hal, which is the computer's name, starts producing some doubtful answers. And when he is questioned by two crew members who are not in hibernation for the trip, this Victorian melodrama has him try to kill the human crew and complete the mission in his own way.

After killing four of them, he is foiled by his lack of knowledge that a man can live in a vacuum without a spacesuit for 10 seconds, or so, and can get back into the emergency hatch. The sole survivor of the crew does this, and in a scene straight out of Dickens, destroys most of Hal's initiative by withdrawing block upon block of his glass-like memory.

It is dubious whether any actor could successfully star in such a role. Certainly, Hal does not manage it.

Drawing away from Hal, the computer, there are some major triumphs in the film.

The spaceships and their construction are nothing less than fabulous. The scene where the shuttle is coming up and docking with the mother station at the

beginning of the film is one of the greatest triumphs of science fiction and is alone worth more than the price of the entire film. Scientifically these are in good hands, and photographically they are magnificently handled, although why the last moments of the docking were omitted is not obvious.

Even the possibilities and problems of space travel are explored (a stewardess walks up the wall), and the tenfold problems of a zero-gravity toilet are briefly dwelled on.

The second half of the picture, made up of wildly colored and un-understandable landscapes with a 17th Century room suddenly appearing, can be taken, or left, as the viewer cares to. Personally, this viewer felt he should have left in the conveniently placed intermission.

Technically, the new version of Cinerama is a disappointment. There is none of the realism of the early Cinerama films. The new wide screen technique may fit drive-in theatres, but it adds nothing to the visual impact of this film. — A.T.

### SILENCE IS GOLDEN . . . .

When it increases the output of your KEYPUNCH GIRLS. Write for details on the AWECO low-cost, effective keypunch silencer cover.



PERIPHERY, INC.  
65 Nicholas Road — Dept. A  
Framingham, Mass. 01701

### calendar

May 6, New York — ACM Seminar, "Computer Assisted Instruction," Roosevelt Hotel. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 6-7, Washington, D.C. — ACM Seminar, "Information: Its Storage Retrieval and Management," Mayflower Hotel. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 6-10, Princeton, N.J. — Digital Computation Course, EAI Computer Center. Contact: Electronic Associates, Inc., 185 Monmouth Pkwy., West Long Beach, N.J. 97764.

May 7, Washington, D.C. — ACM Seminar, "Computer Assisted Instruction," Mayflower Hotel. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 8, Atlanta — ACM Seminar, "Computer Assisted Instruction," Cabana Motor Hotel. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 9, Detroit — ACM Seminar, "Computer Assisted Instruction," Howard Johnson's New Center Motor Lodge. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 9-11, Washington, D.C. — Third Spring National Meeting, In-Plant Printing Management Association, "Progress Through Professionalism" (equipment exhibit, clinics, conference), Washington Hilton Hotel. Contact: In-Plant Printing Management Association, 947 Old York Rd., Abington, Pa. 19001.

May 10, Chicago — ACM Seminar, "Computer Assisted Instruction," Sheraton-Chicago Hotel. Contact: Association for Computing Machinery, Professional Development, 211 East 43rd St., New York, N.Y. 10017.

May 13-15, Bel Harbour, Fla. — 1968 National Automation Conference, American Bankers Association. Contact: ABA, 90 Park Ave., New York, N.Y.

## BUY ★ SELL ★ SWAP

### How To Answer Box Number Ads:

All replies to CW box numbers that appear without an address should be sent to Computerworld, 129 Mt. Auburn St., Cambridge, Mass. 02138.

### For Sale:

024, 026, 047, 056, 402, 403, 407, 360/30 (64K-2mb).

### L.A. Pearl

136 East 57th Street  
New York, N.Y. 10022  
(212) 679-6535

### 729 Model 2 Tape Drives

We wish to purchase/lease/or rent up to 6 IBM 729 Model 2 Tape Drives.

### Call C. Silk

(617) 969-4444

### A.G.O. Keypunching Service, Inc.,

for large or small volume. Recurring and 1 time assignments.

Reasonable Rates  
Service accurate and dependable  
Open 7 days 24 hrs. per day

Call G. Ormond  
(212) 658-4328

Wright Line tape library racks sufficient to hold 2400 tapes in canisters. Wrightline catalog #5726-50, 5776-13, 5789-24, and 5786-24. Cost over \$1700, sell for \$800. Call (408) 245-0795 Everett Turner, Mellonics, 1001 West Maude, Sunnyvale, California, 94086.

### FOR SALE

BRAND NEW DIEBOLD # 4078  
DATA SAFE U.L. APPROVED  
FIRE CLASS 150

Dimensions — 80 3/8" H, 54 3/4" W, 35 7/8" D. The safe has accommodation for 7 disk packs and 139 tape reels. Price — \$2,100 + shipping. Call 212-554-7092 or write Mr. Robert Bongiorno, Operations Manager, Data Processing Department, The Roosevelt Hospital, 428 West 59 Street, New York, N.Y. 10019.

### Wanted for Cash:

082, 083, 084, 088, 519, 552, 557, 548, 805 Test Scoring Machine, 1401, 1440, 360/20.

### L.A. Pearl

136 East 57th Street  
New York, N.Y. 10022  
(212) 679-6535

**SELL** computer time. Data Processing Services. Used equipment. Keypunching services. Programming Services. Leasing services. Consulting services . . . AND YOUR COMPUTER PROGRAMS . . . by advertising in the

### COMPUTERWORLD BUY/SELL/SWAP

Send us your ad copy, including NAME, ADDRESS, & ZIP CODE NUMBER  
\$.50 per word; minimum cost per classified ad is \$14 (28 words)

PAYMENT SHOULD ACCOMPANY ORDER; \$1 EXTRA FOR BILLING

( ) Insert next Issue(s) ( ) Assign Box Number for \$1 extra

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Send bill to: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

RETURN TO: COMPUTERWORLD, 129 Mt. Auburn St., Cambridge, Mass. 02138

## CW's Career Column

**Good Advertising Attracts Applicants**

By Robert Ziegel

Advertising is playing an increasingly important role in EDP recruitment. Due to the tremendous competition for skilled people, effective recruitment advertising must do more than simply describe the available position in a matter-of-fact way.

The cost of attracting a skilled person in the computer field exceeds \$2000 per hiring, according to a recent study conducted by Deutsch & Shea, Inc. The employment manager is under constant pressure to lower recruiting costs and do his job more efficiently. Recruitment advertising is a widely accepted and proven method for attracting new people. If done properly, it can be both economical and effective. If improperly done, it can be terribly expensive and almost totally ineffective.

Good recruitment advertising includes several elements, but there is no simple formula for success. Many innovations have been tried in the field over the past few years. Those that have succeeded have survived. New media have been tried, and some have proved very effective, but by far the most popular and successful of all recruitment media is print. It derives much of its value from its traditional use in this field; i.e., people have come to expect certain types of publications to carry a section devoted to employment advertising. There have been experiments with radio and even TV recruitment advertising that have proved quite successful for volume recruiting, but specific recruiting advertising is almost always in print media.

**Points to Remember**

Basically, an effective recruitment advertisement does these things in roughly this order:

1) Gets the reader's attention. This is essential if the rest of the ad is to be of any value.

2) Describes the position. This aspect may seem patently obvious, but doing it effectively is the true test. Too much or too little can hurt response tremendously.

3) Describes the company. A prospective employee wants to know for whom he will be working, or at least what they do.

4) Explains how to apply. The easier and more convenient you make it, the more responses you are likely to get. Blind or box number ads draw fewer responses than those with company name and address, and the name of the individual to whom responses should be directed.

Getting the attention of the reader is one of the

most competitive aspects of recruitment advertising. As mentioned earlier, this type of advertising is usually run together in a section for the convenience of the reader. Many publications have literally thousands of advertisements at each printing, ranging in size from a few lines to full or even double pages. Size is one way to compete for reader attention, but it is a very expensive way to go. A more economical and very often more effective means of getting attention is the use of an innovative layout, something that will catch the eye of the reader and set your advertisement apart from those around it. A unique layout does not guarantee success, but it does provide you a much better chance to get your copy read.

Describing the position is sometimes a difficult task. Brevity is important, and completeness is essential. Striking a quality and background of your applicants is highly dependent on your success in writing this part of the advertisement. The DP manager or person requesting that the position be filled is in a good position to influence this part of the advertisement, because he provides the job description to the personnel department. His writing of this can go a long way toward determining the final copy.

**How Much Should Be Said?**

Describing the company is very often a touchy aspect of a recruitment advertisement. The use of a logo in conjunction with a motto or slogan will very often be enough to describe a well known company. For the smaller company, however, it is often good to give a brief description of the firm, its present, and its future. When you are a small or new company your recruitment advertisements must sell the company as well as the position.

Explaining how to apply for the position can take several forms. If you are interested in attracting as many applicants as possible, make it easy and straightforward. Box number ads, especially where the company is not named, make people skeptical, and therefore tend to limit responses. Think about it from the standpoint of a prospective applicant for a moment, and you will understand why. In recent years more and more employers have given a phone number in their ads and asked applicants to call collect. This is the ultimate step in making it convenient to apply for a position.

In future articles, I hope to go into this subject in more detail, in an effort to shed some light on this oftentimes vague and sometimes neglected subject. Your questions and comments are most welcome.

**PROGRAMMER  
PROGRAMMER ANALYST**

Excellent opportunities are available in our Management Information Systems Department for qualified individuals to participate in the design, programming, and installation of highly sophisticated manufacturing systems.

Are you capable of the kind of creative thinking and logical analysis necessary to develop computerized systems which will control the manufacturing inventory, purchasing, and shop scheduling for a rapidly growing organization with multi-state manufacturing sites?

Can you design and implement complex programs utilizing large random access devices and magnetic tape? Are you ready to help us grow into teleprocessing, and data collection?

Minimum two years programming experience tape or disk, Autocoder, IOCS, or COBOL. Knowledge of manufacturing systems, teleprocessing, and data collection highly desirable.

If you qualify and desire a challenging position in a growth organization:

Send resume to:

Computerworld, PA/17/02  
60 Austin Street, Newton, Mass. 02160

**BLACK & DECKER MFG. CO.**

An Equal Opportunity Employer

**SCIENTIFIC COMPUTER  
SYSTEMS DEVELOPMENT**

We are continuing to expand our efforts in the development of corporate technical information systems and computer support programs for our research facilities.

Our approach includes the use of statistical analysis, experimental simulation, and time-sharing facilities. Our projects will appeal to persons who have college backgrounds in the sciences, and 2-6 years of systems experience in a research environment.

ALP, FORTRAN-4, and experience in scientific programming for Systems/360 are desirable. Excellent benefits; salary commensurate with qualifications.

Send resume in confidence to PA/17/03 Computerworld, 60 Austin St., Newton, Massachusetts 02160.

**Johnson & Johnson**  
World Leader in Health Care

An equal opportunity employer (m/f)

**POSITION  
ANNOUNCEMENTS****INFORMATION PROCESSING**

We specialize in the placement of data processing and financial personnel. All fees are paid by client companies. Qualified candidates are invited to contact us regarding opportunities ranging from \$8,000 to \$30,000. Replies are held in confidence.

**In Massachusetts:**

200 Boylston Street  
Chestnut Hill  
(617) 969-4010

**In New York:**

6538 Collamer Rd.  
Syracuse, N.Y.  
(315) 463-5295

**In Maine - N.H.:**

94 Auburn Street  
Portland  
(207) 797-2191

**In Rhode Island:**

Garden City Concourse  
Cranston  
(401) 942-5373

**In Connecticut:**

345 North Main Street  
West Hartford  
(203) 236-1931

**RO-MAC & ASSOCIATES**

**OPERATIONS  
RESEARCH  
ANALYST**

New England's fastest growing retail chain, with annual sales of over \$500 million dollars, has an excellent opportunity for an Operations Research Analyst.

This position requires a man with proven analytical abilities to assume responsibilities for new applications. Exposure to applicable computer oriented techniques, such as linear and non-linear programming, simulation, regression analysis and statistical decision theory desirable. Our candidate must have management capabilities. Engineering or math undergraduate degree and some programming experience desirable, but not necessary. Advanced degree with strength in the application of quantitative techniques to practical business problems helpful. We offer attractive salary, full fringe benefit program and definite growth potential. If you feel you qualify, send detailed resume in strict confidence to:

COMPUTERWORLD PA/17/01  
60 Austin St. Newton, Mass.  
02160

**Stop & Shop**

## New Products

## Decollator Runs Light Weight Forms



Anderson Jackson Teletype Cart

A new four part decollator features a paper control which allows running light weight forms and a peek-in slit for visual setting. Tab products new 2390 series decollator has a chute designed for improved refolding and six three inch recessed casters for rollaround mobility. A four speed indicator level is located below the on-off switch and a second on-off switch is placed above the last chute. Tab Products Co., 633 Battery St., San Francisco, Calif. 94111.

## Teletype Cart

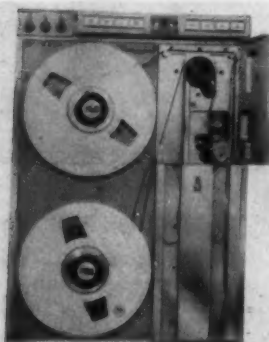
A new cart, designed to make it easy to move a Teletype machine, makes it possible to have a mobile terminal for data communication. The TC-3 cart is made to fit any Model 33 Teletype (ASR or KSR version) and can be attached in 60 seconds. When the cart is used in conjunction with an acoustic data coupler, it makes possible a mobile terminal for data communication. Anderson Jackson, Inc., 2235 Mora Dr., Mountain View, Calif. 94040.

## System for Signal Averaging

The first programmable general purpose computer system for signal averaging has been announced by Digital Equipment Corp. The new LAB-8 system, priced at \$16,900, will also calculate and display the trend and variance of data, provide blow-ups of particular areas of interest and even control the experiment. The system features conversational mode programs for histograms and averaging with variance and trend analyses. It includes Digital's newest small computer, the PDP-8/1, which is the integrated circuit successor to Digital's PDP-8. Digital Equipment Corp., 146 Main St., Maynard, Mass. 01754.



Digital LAB-8 system



Potter Militarized Tape Transport

## Tape Perforator Keyboards

Two paper tape perforator keyboards have been introduced by Photon, a phototypesetting equipment manufacturer. Their new Keycomp 10 and Keycomp 5 machines are closely keyed to phototypesetting applications. The Keycomp 10 has been designed for total accessing of Photon's Textmaster 713 phototypesetters. The somewhat less flexible Keycomp 5 may serve the 713-5 phototypesetter. The Keycomp 10 and 5 are priced at \$9950 and \$5950 respectively. Photon, inc., Wilmington, Mass. 01887.

## Military Tape Transport

A new militarized tape transport system designed for airborne, shipboard, or ground support applications has been introduced by Potter Instrument. Designated Model SC-1141, the transport is a single capstan digital magnetic tape transport system, able to operate at bidirectional tape speeds of 75 ips at standard bit packing densities of 200/556/800 bpi with no program restrictions. The unit is seven or nine channel IBM compatible, and can be used with new Ascii formats. Potter Instrument Co., Inc., 151 Sunnyside Blvd., Plainview, N.Y. 11803.



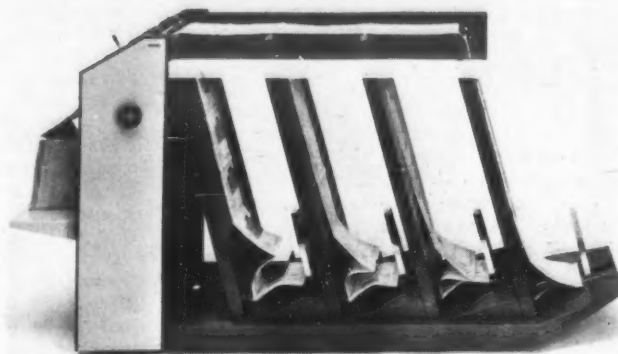
Varion Electrostatic Recorder

## Electrostatic Recorder

In an extension of its line of graphic recorders, Varian Associates is marketing a series of electrostatic recorders designated Statos III. The new line has eight channels, no moving parts, and a claimed maximum total error of one per cent. Statos III has a fixed recording head assembly that will record up to eight analog or digital (BCD) signals in channels 40mm wide. The recording head assembly imprints timing lines across the width of the chart



DAC Acoustical Coupler



Tab Products four-part decollator



Typewriter and tape perforator of Photon's Keycomp keyboard

paper in relation to the data signals. The chart grid lines are electrostatically printed on the paper. Grid patterns such as temperature or pressure can be supplied. Varian Associates, 611 Hansen Way, Palo Alto, Calif. 94303.

## Acoustical Couplers

The DAC Series Acoustical Couplers are designed to be connected through a telephone handset to a terminal such as a Teletype over telephone lines. Chief applications are time sharing,

remote inquiry, and general data transmission. It is switch controllable between EIA (RS232B) and Teletype interface. Half or full duplex operation is standard. Data Communications Systems, Inc., 4230 Central Ave. N.E., Minneapolis, Minn. 55420.

## Romnes Keynotes Spring Conference

(Continued from page 1)

The group's regular informal Saturday meetings often last up to 10 hours and include using the computer for games, school work, file protection schemes, and conversational mode scripts. They use the Trac language under a license from the owner, Calvin Mooers.

The members, all students at Hopewell Valley Central High School, meet in a barn. They are planning a summer program for students from depressed areas of Trenton, N.J., and are trying to form Resistor groups in Trenton and elsewhere.

## Keynote Speech

Romnes opened the conference with a call for creative innovation on the part of communications and computer engineers "in building harmonious systems in which people of all countries and races can live and flourish."

Asking the "right question" is more important today than ever, he said.

"Engineers and scientists must be the humanists, and humanists

must get a grasp of technology and science. We must breed the wisdom to know where to go," he declared.

Romnes told his audience that low cost data sets will soon be introduced. Various trials of initial period rates are being

made, he said, together with an active and energetic study of all rate and charge practices.

Also under study is the need for portable sets and acoustic coupling, he said. A trial of a 50 kilabit switch service, chargeable by the minute, is being conducted

## IBM 2-for-1 Stock Split Approved

BOSTON — IBM's stockholders overwhelmingly approved a 2-for-1 common stock split at the annual meeting here Monday. The split, effective May 9, will be the sixth in 11 years.

IBM Chairman Thomas J. Watson Jr. clashed frequently during the two-hour meeting with Mrs. Wilma Soss, a perennial gadfly at annual meetings. She opposed the reelection of Columbia University President Grayson Kirk to the IBM board, apparently because of recent student unrest at the university, but Kirk was re-elected.

Protests also came from the Young Americans for Freedom, a conservative group, which handed out literature protesting IBM's

trade with Eastern European nations, and from a Boston University theology student, who protested IBM's business involvement with South Africa, which practices racial apartheid.

Watson answered both by stating that the company didn't set foreign policy. An IBM representative later handed out a letter from Secretary of State Dean Rusk which supported trade with Eastern Europe.

In answer to a question about the Justice Department's anti-trust investigation of IBM, Watson said that the company's industry position is "modestly" reducing. He said recent growth has been about 3% a year, slightly less than IBM's growth slightly less